Report of the

DEPARTMENT OF HIGHWAYS STATE OF NEVADA

For the Fiscal Years Ending June 30

1947-1948

W. T. HOLCOMB
State Highway Engineer

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STATE OF NEVADA

SIXTEENTH BIENNIAL REPORT

OF THE

DEPARTMENT OF HIGHWAYS

For the Fiscal Years of
July 1, 1946 to June 30, 1948

W. T. HOLCOMB,
State Highway Engineer

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APPENDIX

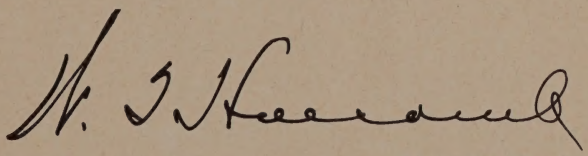
Statistics and tables will be found in the Appendix beginning on page 43.

LETTER OF TRANSMITTAL

To the Honorable Members of the Board of Directors
and the Nevada State Legislature:

There is submitted herewith the Sixteenth Biennial Report of the Nevada Department of Highways covering the activities of the Department for the fiscal years of 1947 and 1948.

The difficulty of solution of the inevitable problems of highway administration during the past biennium has been greatly lessened by the cooperation and understanding of the Public Roads Administration, the Board of Directors, and the citizens of Nevada. We feel it proper to express our sincere appreciation at this time.



State Highway Engineer.

In Memoriam

During the biennium the following employees
of the Department of Highways
were taken by death.

C. A. Box

F. H. Buckner

Leslie G. Cavis

Emma Crabtree

F. H. Depp

Gorman C. Dolan

Earl Fordham

E. L. Krenzer

Hugh R. Lamb

Edward Maher

H. T. McQuiston

Dale B. Pruett

Matt Redington

David D. Stingley

W. E. Wald

DEDICATION

The sixteenth biennial report of the Nevada Department of Highways is dedicated to those employees of long standing whose faithful and efficient service has been instrumental in bringing Nevada roads to their present high standard.

25 OR MORE YEARS OF SERVICE

GLENN F. ARMSTRONG
AUGUST BERNING, JR.
CHARLES BOYER
ERNIE CROSS
GEORGE R. EGAN
JULIAN A. GLOCK
J. LESLIE HANCOCK
ANDREW J. HEIDENREICH
WILLIAM T. HOLCOMB
HUSTON D. MILLS
WILLARD R. PARRY
ERNEST C. POHL
BONNIE O. REID
PAUL RAWLS
OTIS W. WRIGHT

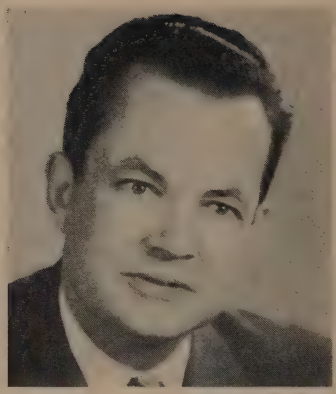
20 TO 25 YEARS OF SERVICE

FRANK J. BERGER
CHARLES C. BLAKER
ELDOR J. BODEN
HIRAM C. BROWN
WALTER E. DUNN
REUBEN E. ELDREDGE
HARRY JOHNSON
ROBERT J. LEWIS
BEN H. LOGAN
FRANK G. LYMAN
FRANK E. MILLER
FRANKLIN H. MORRISON
LORENZO MUGARTEGUI
RAYMOND F. MULLIN
JAMES A. PERRY
ALICE QUINLAN
WILLIAM D. ROBOHM
VERDEN D. ROSE
MARION I. SCHULTZ
DAVE SUTHERLAND
JOHN M. SULLIVAN
MARVIN H. WAITE
WILLIAM E. WALLACE

15 TO 20 YEARS OF SERVICE

R. H. BENNETTS
GORDON B. BROCKWAY
ERDIE C. CHAPMAN
VICTOR W. CLYDE
GEORGE P. COLEMAN
THOMAS L. DRON
SAMUEL C. FAUKALD
VERRILL W. FELL
EUGENE L. FERRETTI
RICHARD L. GAMWELL
WILLIAM H. GIBSON
FRANCIS J. HARMER
LEON B. HAWKINS
DENTON H. HAYS
WILFORD H. HEAPS
GEORGE W. HICKS
WILLIAM E. JOHNSON
MICHAEL J. LANDERS
THOMAS D. LEAVITT
EDWARD C. LEUTZINGER
LAWRENCE W. LITTLE
RALPH LOWER
ERNEST A. MCMURTREY
JOHN T. MANHIRE
KING D. MARCO
JOSEPH D. MEACHAM
JOHN J. MURPHY
WILFRED A. ODELL
JACK A. PARVIN
PAUL E. ROBBINS
ROLAND F. ROY
ESTON G. SCOGGIN
DAVE SHARPE
CHARLES F. SMITH
CARL A. SPRINGMEYER
HERBERT A. SQUIRES
GEORGE H. STARKWEATHER
STANLEY D. SUNDEEN
HAROLD J. VAUGHAN
ANDREW WELSH
WALTER C. WILSON
PERCY L. WOODGATE

GOVERNOR VAIL PITTMAN
Chairman, Board of Directors



ALAN H. BIBLE
Attorney General
Member, Board of Directors

JERRY P. DONOVAN
State Controller
Member, Board of Directors

WILLIAM T. HOLCOMB
State Highway Engineer

STATE HIGHWAY OFFICIALS AND HEADS OF DEPARTMENTS

BOARD OF DIRECTORS

Hon. Vail Pittman, *Governor of Nevada*	Chairman
Hon. Alan H. Bible, *Attorney General*	Member
Hon. Jerry P. Donovan, *State Controller*	Member

DEPARTMENT OF HIGHWAYS

W. T. Holcomb	State Highway Engineer
H. D. Mills	Assistant State Highway Engineer
George R. Egan	Engineer of Surveys and Design
J. D. Meacham	Construction Engineer
A. Berning, Jr.	Engineer of Personnel
Matt Walsh	Equipment Superintendent
C. C. Boyer	Engineer–Federal Aid Roads
F. H. Morrison	Materials and Research Engineer
E. T. Boardman	Bridge Engineer
Paul R. Rawls	Location Engineer
E. C. Pohl	Auditor
Robert F. Guinn	Planning Survey Engineer
C. V. Melarkey	Office Engineer
Malcolm McEachin	Director of Safety
J. C. Walsh	Assistant Administrator, Driver License
Frank G. Lyman	Assistant Engineer, Surveys and Design
Frank Berger	Field Engineer
Kenneth Buck	Director, Public Relations
Stanley D. Sundeen	Chief Draftsman
Ralph Ottini	Traffic Engineer

DIVISION ENGINEERS

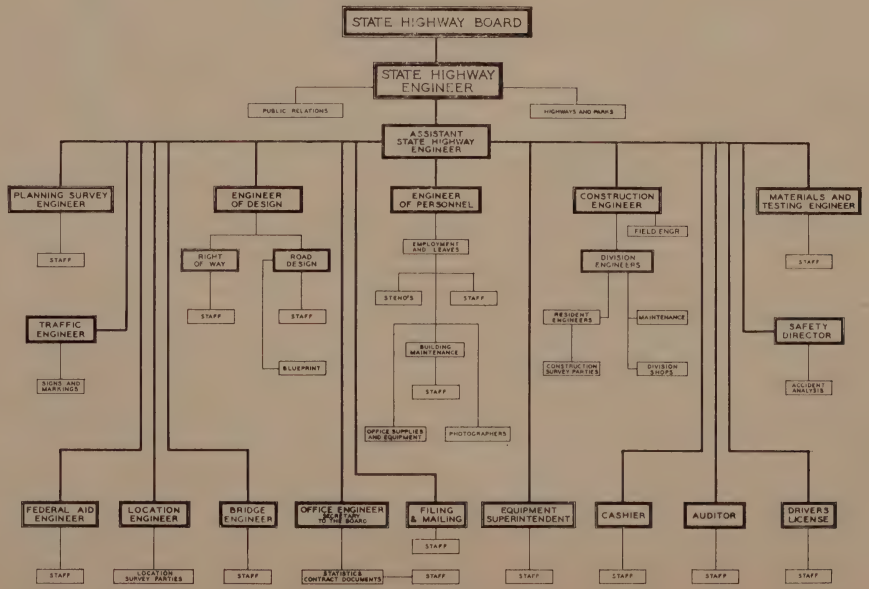
W. O. Wright	Division No. 1
J. L. Hancock	Division No. 2
Julian A. Glock	Division No. 3
W. R. Parry	Division No. 4
Denton H. Hays	Division No. 5

ASSISTANT DIVISION ENGINEERS

G. B. Brockway	Division No. 1
H. A. Squires	Division No. 2
R. E. Eldredge	Division No. 3

ORGANIZATION CHART

STATE OF NEVADA
DEPARTMENT OF HIGHWAYS



DEPARTMENT OF HIGHWAYS
SIXTEENTH BIENNIAL REPORT

In November 1920, State Highway Engineer George W. Borden prefaced the introduction to the Second Biennial Report of the Nevada State Highway Department in the following manner:

> At the close of the last biennial period the war had terminated and it appeared as though conditions were rapidly returning to normal. We, in common with all of the other State Highway Departments of the country, looked forward to the ensuing biennial period as one in which we could do a great amount of construction work without being hampered by difficulties which had previously existed. We believed that we could purchase material and equipment at favorable prices, and that the labor situation would be clarified even to the point that we might be required to partly care for an army of unemployed.
>
> While we are glad that such a chaotic condition did not exist, conditions were far from what had been anticipated, in that prices did not recede, nor was there an overabundance of labor—in fact, not enough labor has been obtainable to properly carry on our work. So acute were the material and equipment situation and labor conditions that to a very large extent our program has been gauged thereby, and we have been forced to seriously consider at different times the advisability of ceasing the attempt to do construction work at all.
>
> Facing, on the one hand, the insistent demand for highway construction, and, on the other, high prices and difficulties of every nature, we have carefully weighed each project before proceeding. In some cases our opinion has been to delay the work until a more opportune time; in others it has been such as to forbid our going ahead at all and, in still others, where the difficulties were sufficiently well removed and the improvements so obviously justified, we felt warranted in proceeding.

Mr. Borden might well have been describing conditions for the period covered by this present report, July 1, 1946, to June 30, 1948. In 1920, however, the move toward motorized transportation was in its infancy and the public was in no way so greatly dependent, as it is today, upon the availability of adequate highway facilities to carry on its daily life.

Conditions in the western States have been especially bad these last two years because of the unprecedented traffic volumes experienced on our roads after the close of the Second World War. Most traffic engineers had expected it would be at least 1950 or later before automobile production filled the gap created by an almost five-year cessation in production for civilian use, and that with the removal of

mileage and speed restrictions many of the older cars would reach automobile graveyards in a comparatively short while. Contrary to these predictions, the end of the war released a surge of traffic which by now has produced traffic volumes in Nevada almost 50 percent greater than those in 1941, the all-time peak prior to the war. Not only were high volumes experienced, but the number of heavy commercial units and the weights of loads carried thereon also jumped to unprecedented levels. Consequently, the department has consistently faced complex problems in developing highway construction programs and the letting of this work to contract.

Practically no construction work was carried on during the war years, and maintenance work was held to a bare minimum. As a result, our highway system contained many miles of dangerously substandard road which would have been replaced by modern construction had not the war intervened.

During the war, the State highway departments and the National Congress laid the groundwork for resuming highway construction once the war was over, and the 1944 Highway Act provided 500 million dollars annually to be distributed among the States during the three-year interval following the cessation of hostilities. The funds were first made available to the States late in 1945, and the construction program was just getting under way at the beginning of the biennial period covered by this report. When the legislation was passed, it was felt the amount of money provided would go a long way toward catching up on work deferred during the war and would make a reasonable start on bringing many miles of our highways to adequate standards. However, the upward trend in cost of all items involved in highway construction was such that actually the money available provided for hardly more than half of the work contemplated under the original plan. It became doubly necessary, therefore, that the State weigh carefully all proposed expenditures in the light of costs, dangerous deficiencies, inconvenience to the traveling public, and probability of lower prices in the future. From the outset the department held to the idea that public safety and convenience came first. In the last two years 40 projects have been advertised for bid, and in only five cases have low bids been rejected, and the projects readvertised, because of what were considered excessive prices. Considering the fact that construction costs have continued to mount since the beginning of our postwar construction program, it is obvious the department in awarding contracts immediately following the war secured prices lower than those which would have been obtained at a later date. By June 30, 1948, all but a small amount of the funds provided under the first postwar Highway Act (the 1944 Act) had been programmed, and it is anticipated that all of these funds will be under contract by June 30, 1949.

The 1944 Highway Act covered the three fiscal years of 1946, 1947, and 1948. In 1947, the American Association of State Highway Officials asked the Congress to continue, for an indefinite period, appropriations similar to those provided under the 1944 Act, so that the highway departments could develop long-range plans with assurance these plans could be carried out. The tremendous cost of providing high-type facilities demanded by the modern motorist made

it imperative that such improvements be carried out piecemeal, and it was felt that assurance of continued Federal support for a considerable length of time would aid the highway departments, not only in consummating long-range plans but in building the necessary highly-trained technical organizations required to effectuate such programs. However, most of the State highway departments found that at the close of the war many of their technical men in military service turned to more lucrative employment than could be offered by public agencies and, as a consequence, the departments were not able to expedite their construction programs to the point where Congress felt they could handle the appropriations requested. As a result, the new Highway Act passed in June of 1948 eliminated altogether Federal highway aid for the fiscal period July 1, 1948, to June 30, 1949, authorized appropriations for the two fiscal years ending June 30, 1950, and June 30, 1951, only, and reduced the authorizations to 450 million dollars a year. Consequently, the State of Nevada will have no Federal assistance during the next fiscal year, and will then receive annually approximately 10 percent less than during the last three years. While this does not mean our construction activities will be sharply curtailed, since we have funds remaining under the original appropriation still to be placed under contract, and funds from the new Act are available for expenditure on July 1, 1949, it does, however, involve serious implications.

During the past two years, the lack of adequate funds, coupled with shortage of technical personnel in the department, has prevented us from reconstructing with Federal-aid funds many miles of our roads which were in such a stage of disrepair as to demand temporary improvement in the interest of public safety. Consequently, the State has been forced to spend large sums of strictly State money in resurfacing such roads. This stopgap work is undesirable, not only because of the use of State funds alone, but because the improvement is temporary, does not bring the road design to modern standards, and, as a consequence, reconstruction to such standards will be necessary within a comparatively short time. The elimination of Federal-aid for the 1949 fiscal year will in no way help this situation.

The 1944 Highway Act for the first time made available considerable sums earmarked exclusively for the construction of farm-to-market and mine-to-market roads. This Act provides that, in selecting feeder roads on which such funds shall be expended, the State highway department shall cooperate with appropriate local road officials. The department has complied with the requirements of the Act by soliciting the advice and cooperation of the various county commissioners in selecting the roads to be included in the Federal-aid secondary system and in establishing priorities of construction. Construction work has been allocated to the counties based on a formula involving with equal weight the percentage relationship of population, exclusive of urban areas over 5,000; rural road mileage, exclusive of mileage on the Federal-aid highway system; rural vehicle miles of travel, exclusive of that on the Federal-aid system; and total area. An effort is being made to bring the amount of work accomplished in each county in line with the over-all average for the State, keeping in mind at the same time the importance of various routes from the

standpoint of over-all benefits, not only to the local communities but to the State as a whole. It is believed that the maximum Federal-aid secondary system the State can eventually develop and maintain will approximate 2,500 miles. The completion of work to be financed with funds from the first three-year program will result in initial improvement of approximately one-half the mileage of such a system.

The financial situation of the department is, as yet, on a sound basis. During the war a substantial balance was accumulated in spite of a decided drop in revenue, because the State had no Federal-aid construction money to match. With this balance we have been able to match the money provided under the 1944 Act, to a large extent, accord our maintenance forces modern equipment, and carry on our maintenance work. Since the close of the war, increases in motor-vehicle registration, truck carrier licenses, and revenue from gasoline and use fuel sales have provided an annual income considerably in excess of that available to us before the war. However, the decreased buying power of the dollar, coupled with the fact that, under the Federal-aid secondary program, we are building many miles of new highway for which we must assume the maintenance responsibility, threatens to disrupt our financial stability, and poses a future problem which we must now begin to analyze and prepare for. It is felt that sufficient funds will be available to match our Federal-aid and carry on necessary maintenance and other needed improvements until the Legislature again meets in 1951. By then, perhaps, we shall be in a better position to judge the adequacy of highway revenue in comparison to needed expenditures.

RECOMMENDATIONS

1. It is respectfully recommended that the Revolving Fund of the Department of Highways be increased from its present $60,000 to $100,000. This fund is used to pay salaries, emergency right-of-way payments, driver license refunds, and travel and subsistence claims. Added maintenance and survey costs, occasioned by the increasing mileage of the State highway system and rising prices, at present necessitates reimbursement of the fund four and five times a month. Since claims are approved only twice a month it becomes necessary to request additional dispensation on extra claims. The procedure represents an unnecessary burden of detail upon the Board of Directors, the State Controller, and responsible officials of the department. It should be pointed out that the requested increase in Revolving Fund capacity does not, in any manner, represent an enlarged expenditure or expense to the State, but would serve solely to expedite and assist in administration.

2. It is respectfully recommended that the Legislature consider the advisability of construction of a new State Highway Building to alleviate the serious overcrowding of present quarters which has resulted in dispersal to quonset huts and resort to make-shift facilities. Construction of such a building would result in added efficiency and would make available to other crowded offices the several quarters now occupied by the department.

3. It is respectfully recommended that the Board of Directors of the Department of Highways be given authority to establish speed limits

in specific zones on the public highway. This request is prompted by consideration of situations prevailing on certain sections of road where sight distances, curvatures, and widths are not compatible with uncontrolled modern travel.

4. It is respectfully recommended that the present limit of $2,000 for purchase of passenger motor vehicles be raised to an amount comparable with existing prices. This recommendation is based upon the fact that the type and variety of vehicles available within present price limits has been severely restricted by recent price increases. Present conditions, and forecasts by business authorities, indicate that a further increase in car prices may be anticipated.

5. It is respectfully recommended that consideration be given to means of providing increased revenue in order that the driver license division may be completely self-supporting. Expenditures incurred in giving driving examinations represent a substantial part of the disbursements of the division and it is believed that a reasonable charge for such service will eliminate all deficits.

It is further recommended that the driver license law be amended to provide for a mandatory revocation of license for one year upon a second conviction of drunken driving. It is further recommended that consideration be given to amending the law so that punishment for a second offense must necessarily be greater than that for the first.

It is further recommended that the law be amended to establish that two convictions of drunken driving shall be prima-facie evidence of conduct inimical to the public safety in the operation of motor vehicles upon the public highway, which must be rebutted in the opinion of the administrator before license may be issued.

6. It is respectfully recommended that the present State law, approved March 31, 1941 (402), establishing semimonthly pay days for State officers and employees be amended to permit payment at regular two-week periods at the discretion of individual departments or agencies. Such a method of payment would substantially aid cost-accounting procedures in the Department of Highways, would not interfere in any manner with accounting procedures in other offices, and would be a direct contribution to over-all efficiency and economy. At the present time it is necessary to use eight different salary tables in apportioning costs, covering pay periods of 80, 84, 88, 92, 96, 100, 104, and 108 hours. A uniform two-week period would require only two salary tables for the uniform pay periods of 80 and 96 hours. Such a system would also be of advantage in the preparation of budgets, work plans and estimates, statistical studies, and related matters.

PERSONNEL

Personnel problems have engaged the attention of department officials to a considerable extent during the past several years, first because of the war employment emergency, and, during the past biennium, because of the dislocations of the postwar period.

One serious problem confronting the department today is the shortage of experienced technical help. Attempts are being made to secure additional competent men but, because of present salary brackets, the department cannot compete with private industry and outside agencies in securing the services of trained men. In many

cases experienced employees have left the department after years of service to take advantage of higher salaries. Qualified men have been obtained only to stay a short period. This situation is particularly true with respect to engineering personnel.

The need for trained and experienced men has also increased owing to the fact that some branches of highway engineering and administration have, of necessity, become highly specialized. The positions cannot be filled by persons of only general training.

Two courses suggest themselves in meeting this very serious problem. The first is that of long years of progressive experience, plus a program of self-education, in the ranks of the department. Many employees in responsible positions reached their present status in this manner and are now well qualified in their respective departments.

The second course is the enrollment of graduates of engineering colleges of recognized standing. This would require a lesser period of progressive experience and would produce faster and earlier results.

The department has been aware for some time that it is at a distinct disadvantage in obtaining and holding the type of employee which its skilled and demanding work requires. This disadvantage is primarily due to the relatively low salary schedules that have not kept pace with the salaries paid by private industry or other agencies.

During war years the supply of college graduates in engineering became decidedly limited. Because of the decreased enrollment in technical courses during that period, the condition will probably continue for several years. High wages elsewhere have attracted and are attracting eligible persons who in other years were willing to accept employment in the lower brackets of the department with the expectation and desire of working up to higher positions. Graduates from engineering schools are now entering private industry at starting salaries far in excess of the amount which the department can offer.

The lack of sufficient experienced engineering personnel will be reflected to some extent in 1949 and 1950, as it has been during the past biennium, in delays in preparation of plans, the acquisition of rights-of-way, and the staffing of crews to supervise construction projects.

FINANCE

Highway revenue from State sources continued to rise throughout the biennium. It is worthy of note, however, that the gain in the second half of the period was considerably less than in the first half. It is an indication that receipts are approaching a peak which is expected to be reached during the coming biennium.

Revenue from gasoline and use fuel taxes in the fiscal year of 1947 showed a gain over the similar 1946 period of $491,220.34. The latter half of the biennium registered a gain of $208,064.54.

Auto license and carrier fees in the fiscal year of 1947 increased $139,568.76 over the preceding year. The gain in the fiscal year of 1948 was $104,410.66.

Maintenance costs have risen steadily, and will continue to rise, as additional mileage is added to State commitments. In the fiscal

year of 1946 road maintenance costs were $855,194.89. In 1947 they had risen to $1,051,422.22, and in 1948 to $1,256,025.61.

The time is not far off when the State must determine the extent of its responsibility for highway maintenance. The expansion of our highway system will be set within the limits of the revenue available for that purpose. Each year, since the creation of the Highway Department, there has been an appreciable increase in mileage. The maintenance of roads is a direct charge upon State revenues, and maintenance costs must inevitably approach the limit of revenue.

Due to the lack of appropriations of Federal funds during the war years our roads deteriorated substantially, with the result that the present limited Federal appropriations are insufficient to bring all of the worn-out sections to needed standards. A considerable amount of State funds was required to supplement Federal and State matching moneys to redeem several sections of highway which had approached an unusable condition.

Payment of $100,000 to the Federal government during the biennium accomplished the complete retirement of a $600,000 trust fund which had been advanced to Nevada under the Defense Highway Act of 1941.

A detailed statement of receipts and disbursements will be found in Tables 1, 2, 3, and 4 in the Appendix.

CONSTRUCTION

During the past biennium 38 contracts were awarded covering the construction or reconstruction of 377.062 miles of highways at a total cost of $7,438,921.45. Of these 38 contracts, 14 were completed during the biennium, covering 153.488 miles at a cost of $3,030,567.38. Contracts under way but not completed at the end of the biennium numbered 24 with a mileage of 223.574 and a contracted cost of $4,408,354.07.

In addition to the foregoing, 12 contracts which had been awarded prior to July 1, 1946, were completed during the past two years. They covered a distance of 151.524 miles at a cost of $3,353,263.50.

During this period the Public Roads Administration awarded two contracts covering a total of 19.110 miles of reconstruction on U S 50 near Austin. The cost of the two projects was $537,922.60.

An itemized summary of contracts awarded during the two-year period will be found in the Appendix.

ROADWAY DESIGN

During the two-year period covered by this report, the design department has prepared plans, estimates, and specifications for 374.6 miles of highways through the State, of which 275.0 miles were new construction or reconstruction and 99.6 miles were asphalt surfacing projects which had been previously constructed to a gravel-surface stage. A summary, by counties, of plans completed during the biennium is shown in the Appendix.

In addition to the above, the design department prepared plans for sewage disposal at the Reno maintenance yard, removal of trees

and buildings from the right-of-way on the Reno south project, a parking area at Mt. Rose Bowl, 12 grade-crossing-protection projects, and numerous other minor designs.

This department collaborated with the Public Roads Administration in the preparation of plans for two Federal land and one Federal forest project, increasing the total mileage of plans prepared for highways throughout the State to 398.9 miles.

Plans prepared are segregated as follows:

Primary highways	104.4 miles
Secondary highways	285.2 miles
Urban highways	4.1 miles
Forest highways	5.2 miles
Total	398.9 miles

Primary highways were designed for speeds of 50 miles per hour within urban areas, 50 to 65 miles per hour in mountainous country, and 70 miles per hour through rolling and flat terrain. The mini-

The trend of highway construction in heavily traveled areas is indicated by this four-lane divided highway between Las Vegas and Henderson.

mum roadbed width for primary highways was held at 32 feet, providing two 12-foot travel lanes with 4-foot shoulders. However, a standard width of roadbed for interregional highways on the national system of Interstate Highways (U S 40 and U S 91) has been established at 40 feet, which provides two 12-foot traffic lanes with 8-foot shoulders. The 40-foot roadbed is also used on other sections of the primary system where traffic volumes justify its use. On heavier traveled sections of the primary highway system where sight distance

for passing is impaired due to summits or other obstructions which would otherwise require fast-moving traffic to follow slow-moving vehicles for considerable distances before safe passing is possible, an additional 12-foot traffic lane has been provided to permit safe passing. On summits, this design procedure has resulted in the construction of four traffic lanes for short distances.

Secondary highways were designed for 70 miles per hour in flat and rolling terrain, and 50 miles per hour in mountainous country, when sight distances and curvatures permit such speed. Roadbed widths were maintained at 24 feet in most cases, and surfacing material was placed full width.

Most intricate and detailed highway design prepared by the department during the biennium was the urban project in Las Vegas on Main Street and Bonanza Road. These two streets in Las Vegas are on the Federal-aid primary system and eligible for improvement with Federal-aid funds. Special features incorporated into this project were the channelization of the intersections at Main Street and Bonanza Road, Bonanza Road and Second Street, and Bonanza Road and Fifth Street.

The junction of Main Street and Bonanza Road is one of the busiest intersections in the State. In preparing the design for this intersection a great deal of study was necessary in order to provide for the requisite number of traffic lanes, together with proper channelization, curbs and gutters, and sidewalk areas, all to be embraced within a prescribed right-of-way so as to incur the least damage to abutting property. In order to prepare a design that would care for all of the above requirements it was necessary to consider traffic volumes, and traffic-turning movements, together with pedestrian volumes and habits.

Channelization consists of raised concrete curbs which form dividing strips between opposing traffic, and islands to direct traffic into proper lanes. The dividing strips and islands also act as refuge for pedestrians crossing the wide streets.

RIGHTS-OF-WAY

Acquisitions of rights-of-way have become increasingly expensive and difficult. New problems are continually arising while old ones seldom decrease. Real estate values have risen sharply along with building costs during the past several years, making the determination of market values and, hence, equitable prices for land and improvements more difficult.

On a considerable portion of the mileage for which rights-of-way have been obtained, acquisitions consist of additions to original rights-of-way to permit widening required by increasing traffic loads. In the interim between original construction and widening, numerous improvements have been erected by abutting owners, many of which must be adjusted if the highway is to be widened. This is particularly true in the strip developments which have occurred adjacent to practically every city and town situated on a major highway. In addition, there is a decided tendency to break holdings into smaller and smaller parcels, thereby increasing the number of owners with whom negotiations must be carried on.

Every effort is made to reach a fair and amicable agreement with each owner, but in occasional instances this is not possible and it is necessary to resort to condemnation. Larger numbers of owners with widely divergent views of property values has tended to increase the number of condemnation suits and it appears that this problem will become more prominent in the future. Extended negotiations required have, in some instances, delayed construction and have made it necessary to revise procedures in order to make rights-of-way available when needed for construction.

Highways have largely enhanced the value of abutting lands and

A section of the Fallon-Stillwater road. An example of "farm-to-market" and "mine-to-market" roadbuilding.

improvements in some localities. Development of these properties has been a factor in increasing traffic volumes and hazards, thus making widening necessary. Conversely, the cost of obtaining additional rights-of-way is greatly increased, as is the opposition of owners to acquisitions and to adjustments of improvements.

In some areas application of zoning and set-back laws has been of assistance in right-of-way work. This is especially true in the Las Vegas area where ordinances are in effect on all major highways, and to a lesser extent in the Reno area where complete application of such ordinances is not yet in effect. Extension of zoning and set-back laws to all portions of the highway system would result in a

very considerable saving in costs for right-of-way and would permit an undisturbed development of abutting properties.

Continued withdrawal of large areas of public lands for special purposes by various Federal agencies has added steps to the process of acquiring such lands for highway purposes. Reorganization of the U. S. Land Office and the U. S. Grazing Service into the Bureau of Land Management has also complicated procedures in acquiring Federal lands.

Despite the added problems and complications, right-of-way acquisitions have kept pace with construction needs in most instances. Additional personnel is needed to advance right-of-way work to ensure availability when required. Because of higher salaries paid in other engineering fields, particularly private industry, it has been difficult to maintain the right-of-way staff at the desired level for maximum efficiency. The average number of full-time employees on the right-of-way staff during the biennium was nine, consisting of one right-of-way office engineer, two right-of-way agents, five draftsmen, and one stenographer.

Acreage acquired during the biennium for various projects throughout the State, including cost, and the acreage of all lands acquired by the department since its inception are shown in the Appendix.

EQUIPMENT

The end of priorities on parts and equipment and a gradual easement on release from manufacturers to dealers enabled the department to purchase an urgently needed 317 pieces of equipment during the biennium. The new equipment replaced many worn-out units which had been maintained and operated during the war years at excessive costs owing to the impossibility of replacement.

The division operates and maintains 791 major units of equipment which are distributed through the State as follows: Division 1, 88; Division 2, 198; Division 3, 133; Division 4, 149; Division 5, 105; Engineering, 71; Headquarters, 35; Reno Plant, 12.

During the biennium the equipment division completed 3,291 equipment repair jobs, ranging from a half-hour service to the 400-hour complete overhaul on a shovel. These figures do not include the jobs completed in the five division shops. The cost of parts, labor, and tires to maintain equipment at the five division shops and the Reno Plant is reflected in maintenance expenditures for the two-year period.

In January of 1947 a firebox explosion and subsequent fire destroyed the boiler room at the Reno Plant. The building was replaced at once and is now modern and efficient. A new building, housing a steam cleaner, was constructed to permit the steam cleaning of a complete unit prior to repair or painting.

The sign department was enlarged by an addition of 32 by 20 feet to allow space for metal shears used in cutting sheet steel for highway signs. Two additional stalls were constructed along the north line of the Reno Plant for the storage of stakes, hubs, guineas, and other equipment.

A storage garage was constructed at Galena Creek on the Mt. Rose road for heavy snow-removal units which keeps the equipment close

Previous driving difficulties in Wilson Canyon on State Route 3 are illustrated by a sign which states: "Turn Out—Pass Here."

After maintenance crews have widened the roadway, motorists through Wilson Canyon find driving to be easy and pleasant.

to its work and eliminates 30 miles of travel each day during the snow-removal season.

Teletype equipment has been installed at headquarters, the Reno Plant, and Division Offices, which has eliminated mistakes on orders received from the field for parts and materials. All buildings have been properly maintained during the biennium.

The end of the biennium again finds equipment and some parts becoming difficult of replacement and entirely unavailable in some cases. The price of passenger equipment has risen, in most instances, to a point in excess of the amount allowed by law for purchase.

SURVEYS AND RECONNAISSANCE

During the past biennium, survey work has been increased over the previous biennial period. This increase was made necessary by the increased postwar construction program and the necessity of making surveys sufficiently in advance to allow the preparation of design plans and cost estimates for such programs.

At the present time a considerable portion of reconstruction on primary routes has been completed, or is under way, and surveys have been completed on most sections still in need of reconstruction which may be undertaken as soon as funds are available.

Certain portions of the more recent highway appropriations have been allotted for secondary road projects. These secondary road projects are located and designed on a lower standard than primary routes. This makes possible the construction of increased mileage as compared to the amount of work that could be performed on primary projects with similar funds. In accordance with this increased secondary road program a greater portion of the survey work during the past biennium has been performed on secondary road projects proportioned throughout the seventeen counties of the State.

In most instances the principal highway route or routes of specific areas pass through the cities and towns of the State, and any highway improvement is limited due to business and residential districts on both sides of the road. These conditions are most apparent in the cities of Reno and Las Vegas. Consideration has been given to the feasibility of providing alternate routes away from the central business districts to alleviate the increasing traffic problems on the existing highway routes. Some preliminary work has been performed with regard to the best selection of these alternate routes.

A table showing the total amount of surveyed mileage, segregated by the several counties, is carried in the Appendix. In this table the miles of surveys include only the adopted mileage over which construction is anticipated, and excludes preliminary and alternate surveys sometimes necessary to determine the most feasible and economic routes. The cost of preliminary and alternate surveys and the cost of surveys for obtaining special or additional data on difficult projects is included in the cost of the surveys. Preliminary and alternate surveys are necessary on certain projects and are a definite part of the ultimate survey cost. They are, therefore, prorated into the projects on which they occur and are included in the per-mile cost and total cost of surveyed mileage for the biennium.

MATERIALS TESTING AND RESEARCH

The functions of the Materials Testing and Research Department are, briefly, as follows:

1. To make preliminary investigation of soils, selected material, gravel, rock, water, etc., to be used in subgrade and roadbed of proposed construction and to furnish the results of such studies, with recommendations, to the agencies or departments concerned.
2. To test and inspect all processed and manufactured material used in construction and maintenance of the highways together with instruction and supervision of personnel handling field tests.
3. To make special investigations to obtain information concerning quality or service behavior of materials.
4. To aid, as requested, in the preparation of specifications and special reports.

A minor duty of the department, but one requiring attention every day of the year, is the operation of the official cooperative U. S. Weather Station in Carson City.

The department has endeavored, in the past biennium, to improve methods of prospecting subgrade and material deposits. Formerly, most of this work was done by hand. While hand methods cannot be altogether discarded, the department recently secured a power auger and trench hoe which have made possible more thorough prospecting at considerable saving in time and labor.

The auger is equipped with bits ranging from 8 inches to 24 inches in diameter, and is capable of sinking a hole to a depth of 10 feet. With the trench hoe, test pits can be dug to a depth of 14 feet and the ends may be sloped to provide egress for livestock and wild animals falling into or otherwise entering the pit. It is desirable to leave test pits open at material deposit sites to enable contractors and highway officials to make visual examinations. Hand-dug or auger-dug holes must be refilled immediately after sampling as a safety measure.

Better control of the production of base and surfacing aggregates has been attempted by inclusion of liquid limit and plasticity tests among "on the job" tests. Heretofore, such tests, because of the skill and care required, have been handled only in the headquarters laboratory. Adaptation of these special tests to field conditions has required careful choice and training of field laboratory personnel and has made necessary the addition of special field apparatus.

Another field test added during the past biennium is the measurement of the volume of air introduced in concrete by use of air-entraining agents.

A summary of samples tested in the headquarters laboratory at Carson City during the fiscal years ending June 30, 1947, and June 30, 1948, will be found in the Appendix. Several thousand samples, in addition to those shown in the summary, were tested in the field laboratories in "on the job" control work. The field tests are not included in the summary.

It should be noted that approximately ten percent of the tests shown originated from sources other than highways. Several Federal agencies such as the U. S. Indian Service, the Reclamation Service,

the Naval Ammunition Depot, the Civil Aeronautics Administration, and the Veterans Administration requested 118 tests. State sources, including the Fish and Game Commission, the State Mental Hospital, the State Prison, the Orphans' Home, and State Capitol accounted for 231 others. Samples, numbering 169, were tested for eight Nevada municipalities, and 369 for 47 different contractors and individuals who could not conveniently obtain such service elsewhere. A nominal fee to cover expenses of material and personnel is charged for such tests.

BRIDGES AND GRADE SEPARATION STRUCTURES

The bridge department's principal duty is the design of bridges and grade-separation structures. Other tasks within its purview include design of minor structures, checking of shop drawings of structural and reinforcing steel, inspection of bridges under construction, and inspection of bridges for maintenance.

Construction of bridges on secondary routes has exceeded construction of bridges on primary routes during the past biennium. On the secondary routes 10 bridges were constructed by the highway department and three by the Public Roads Administration. Eight bridges were constructed on the Federal-aid routes.

Work on U S 40, a Federal-aid route, was designed to bring structures up to the standard required for the interstate highway system. This standard requires a roadway width of 30 feet for the longer structures and full shoulder width, or 40 feet, for the smaller structures. Four bridges were widened and one added near Dunphy, and one widened near Battle Mountain. One bridge was widened in Las Vegas. On U S 395 one bridge was added as an overflow structure north of Cradlebaugh's Bridge over the Carson River in Douglas County.

On secondary routes the new bridges are replacing the inadequate county bridges or are on new alignments of county roads. On Route 8A, north of Austin, a new concrete bridge was built over the Reese River. Two reinforced concrete boxes of bridge size were built on Route 20 north of Eureka. Four new concrete bridges, replacing five old timber bridges, were built on Walley's Lane in Douglas County. Three concrete boxes were constructed in Dalzell Canyon on Route 22 southeast of Wellington. Under construction at the present time is a concrete bridge over the Truckee River near the Nevada Mental Hospital. This replaces a steel truss which will be used by Washoe County near Lockwood dam east of Sparks. In addition to the above structures completed or under construction, five bridges in Douglas County received major repairs in 1947. These were timber bridges built in 1936. The repairs consisted of replacement of the timber deck with reinforced concrete and replacement of stringers and caps which had rotted.

A considerable amount of time was spent in the design of the Charleston Underpass in Las Vegas. Plans for this structure are now complete, but the contract will not be awarded until the next biennium.

The total cost of bridges constructed and major repairs was

$279,488. This is the greatest amount spent on bridge construction during any biennium since the one ending June 30, 1940.

It should be noted from the table, "Bridge and Grade Separation Summary," in the Appendix that all of the new structures built during this biennium are of reinforced concrete. It should also be noted that the number of timber structures built by some agency other than the Department of Highways has been reduced so that there are now more reinforced concrete bridges than timber bridges.

PLANNING SURVEY

The Planning Survey, organized in 1935 as a separate division within the Nevada State Highway Department in compliance with the request of the U. S. Bureau of Public Roads, has completed its twelfth year of service as a fact-finding agency of the highway department.

The importance of the planning surveys of State highway departments is evidenced by the continuance of Federal participation, providing "not to exceed 1½ per centum of the amount apportioned for any year to any State under the Federal Highway Act" to be used "with or without State funds for surveys, plans, engineering, and economic investigations of projects for future construction in such State, and for highway research necessary in connection therewith."

At the present time the matching ratio of funds for planning survey activities is 82.56 percent from the Federal government and 17.44 percent from the State.

While curtailment of Planning Survey activities occurred during the war, the postwar years have brought an expansion of activities, and the demands for compiled data brought up-to-date have increased the work load of the department.

Following is a summary of the activities of the Planning Survey of the Nevada State Highway Department for the past two fiscal years.

INVENTORY

At the inception of the rural inventory study very little was known of the mileage and condition of the many roads in Nevada that were off the State system. Maps depicting various rural roads were at a variance, and details of adjoining culture were lacking. The original survey conducted in 1936 revealed a total of 23,385 miles of road in the State, and furnished data for preparing more detailed maps than had been previously available.

The reinventory study has been continued since that date to insure current, accurate information. This is necessary since rural roads under the jurisdiction of local agencies are from time to time improved, realigned, and shortened, and in some cases abandoned through disuse. Changing of cultural features, the extension of corporate limits, and an insistent demand for more accurate maps are all factors necessitating a continuous reinventory.

The reinventory work started March 11, 1946, and up to August 1947 covered 4,488 miles of road in Douglas, Clark, Humboldt, Lyon, Storey, and Washoe Counties. An average of 24 miles per day was logged and 184 actual working days were required.

MAPPING

The mapping division of the Planning Survey continued with revisions of current maps with data secured from the inventory study, as well as completing various miscellaneous projects during the biennium.

Annual traffic flow maps, showing the results of the 1946–1947 traffic studies, were prepared. The mapping division also prepares, annually, maps showing the approved Federal-aid, Federal-aid secondary, forest highway and Federal lands projects, and a map of the designated State system, as well as the State highway map issued to the motoring public.

During the biennium, the mapping division also prepared maps showing new Federal-aid route sections and control sections, a system of designating units of roads which is discussed in this report under the heading of "Road Life Studies."

Such a demand was encountered for planning survey map sheets that it was necessary to initiate a charge for them on a cost basis. A record of map sales kept for 1947 and for the first half of 1948 reveals that 2,085 maps were sold for $854.50.

During January to March, 1947, the U. S. Coast and Geodetic Survey completed the extension of first-order triangulation control in the Reno-Sparks area, and personnel from the planning division cooperated during this work. The points set were so selected as to provide additional control for our road logs, and, by utilizing this control, it is believed the maps around the Reno-Sparks area and for a considerable distance on either side will be exceptionally accurate both as to the location of roads and the land grid.

TRAFFIC

During the biennium, additional portable traffic recorders were purchased. These recorders were necessary in order to handle the increased scope of the traffic study. Four recording-type and three nonrecording-type recorders have been in use in a special study carried on in Reno since January 1, 1947, on a rotating basis at 10 selected sites.

The reinventory of traffic in Washoe, Storey, Ormsby, and Douglas Counties was begun January 1, 1948, using 7 recording-type recorders and 20 portable-type recorders.

In June 1948 a new plan in regard to having a man permanently stationed in Las Vegas was initiated. Using 11 nonrecording-type and 1 recording-type recorder that prints every 15 minutes, a series of schedules was set up to cover the area made up of Clark and most of Lincoln and Nye Counties. In addition, he checks and maintains the fixed recorders at Logandale and in the vicinity of Las Vegas. Plans were also made to begin traffic inventory in Reno and Sparks in July using portable and manual counts.

At the end of the biennium covered by this report the planning survey had in operation "fixed" or "stationary" type automatic recorders at 16 selected stations believed to give representative pictures of vehicular traffic throughout the state. The location of each fixed recorder, and the annual daily average traffic past the automatic counter during each of the last six fiscal years are shown in the

Appendix. Also shown are the percentages of traffic change from year to year. These annual figures from the fixed recorders keep the traffic data current for the principal roads of the State. Supplemental data necessary for a more complete picture of the State's vehicular traffic are obtained through use of small "portable" recorders, which are installed weekly. Thirteen schedules of approximately 21 stations each are maintained throughout the year. Under the present arrangement approximately 472 sites for counting traffic are used one or more times annually.

During the past biennium numerous short-period manual classification counts were taken separately or in conjunction with the regular portable-recorder operations for the purpose of obtaining information for traffic classification and volume within unincorporated towns.

The annual traffic census taken in July of each year during a week not including the abnormal Fourth of July traffic, covered the period July 14–20 in 1947 and July 12–18 in 1948. The results of these studies at 80-odd stations, breaking down the traffic totals into commercial, foreign, and Nevada cars, are published annually in a separate pamphlet entitled "Tabulation of Annual Traffic Census."

For the purpose of obtaining accurate classification of traffic on a year-around basis, manual 8-hour or 16-hour counts are taken one day in January at 43 July manual-count stations regarded as key road junctions of the State.

FINANCIAL

The three subjects of the financial section's work were continued at an increased tempo during the 1946–1948 postwar biennium. These subjects are the fiscal survey, statistical, and road-life studies.

Fiscal Survey.

The fiscal survey covers a study and analysis of highway income and expenditures of all units of government within the State. The value of such a study has long been realized by all officials concerned with highway legislation, planning and construction. Faced with increasing costs of construction and maintenance of roads and a demand for more roads, without a consequent increase of income, highway officials must have data furnished by the fiscal survey to sensibly plan the maximum mileage of roads that can be built and maintained.

The fiscal study has been brought to a current status during the biennium, and information secured during the past 12 years is being analyzed and utilized in seeking a solution to some of the problems facing the department. Information secured from the fiscal survey is being coordinated with data secured in the road-life study to obtain an over-all picture of road income and expenditures, and costs of construction and maintenance within the State.

Statistics.

The statistical study of the planning section is a direct tie-in with the fiscal and road-life studies. Monthly tables and graphs are prepared showing the State's major sources of motor vehicle revenue,

namely, from motor vehicle fuel taxes, carrier license fees, and motor vehicle registration fees. Comparisons are made by years, and trends are forecast by statistical methods in an effort to estimate probable revenue for future years.

The tables and graphs prepared by the statistical section of the planning survey are of value as evidenced by an increased demand by private businesses, public officials, and organizations for the data secured.

Road Life.

The adoption of this system of cost accounting by the department entailed considerable work. A "route section" and "control section" system of designating units of the highway system was established with the aid and cooperation of the Public Roads Administration. By means of this system a section of highway with fixed termini is established as an accounting unit for all time, making it possible to study costs of construction and maintenance by various surface types. The road-life study makes the cost distribution of construction costs, and these costs are incorporated in the general accounting department accounts.

Simply stated, the function of the road-life study is to determine the average life of roads by types, to forecast the mileage of roads of each type that will have to be resurfaced or reconstructed each year in the future, to determine the cost of a road by elements of construction operations and to secure the State's investment in its highway system. With this information correlated with data obtained from the fiscal, statistical, and maintenance studies, highway officials can intelligently plan their road-building programs.

For the biennium the road-life section has been classifying past and present contracts in their respective cost accounts and allocating them to the control sections and plotting the construction operations to accomplish the objectives previously enumerated.

Special Studies.

The facilities of the Planning Survey were employed in various special studies during the biennium. A traffic study of the city of Sparks was made at the request of officials, and a report of the findings was submitted.

A special turning-movement study was made at the intersection of U S 40 and Main Street in Lovelock, at four intersections in Carson City, and at the intersection of 15th and B Streets in Sparks to determine whether or not traffic conditions warranted stop-light installations.

Speed and car-occupancy studies were conducted at six regularly scheduled sites.

An origin-and-destination study was conducted at Pioche to determine the need of an alternate truck route.

The annual truck-weight study was taken at regular sites.

Other special compilations and tables were prepared showing traffic on specific road sections at the request of city officials, county commissioners and governmental agencies.

TRAFFIC AND SIGNS

The department of Traffic and Signs, headed by the Traffic Engineer, is concerned with production and placing of signs, center-line striping, special traffic studies in conjunction with the planning division, and cooperation with the safety department in the elimination of hazards by proper signing or striping.

A modern sign-production plant has been established at the Reno maintenance department, and signs are being manufactured in accordance with standards set by the American Association of State Highway Officials, which are uniform throughout the United States. Such uniformity serves to convey information through the shape of the sign as well as the lettering. The normal life of a sign is five years, but vandalism—principally through use of firearms—is at present costing the State of Nevada approximately $6,000 yearly through forcing replacement before a normal replacement period. Advances are being made in the use of self-illuminating material on signs placed in key and strategic positions.

Approximately 1,800 miles of highway are striped in each season at a cost of $55,000. Winter weather usually prohibits operation. Two striping units are employed, one each being headquartered in Las Vegas and Reno. With these machines a crew is able to place an average of 50 miles of center-line each day. The dashed center-line, consisting of a 15-foot painted strip and a 25-foot skip, is employed at a substantial saving of paint. The dashed line also has the advantage of discriminating between a center stripe and a non-passing barrier line.

The advisability of parallel parking on all highways leading through towns and cities is being submitted to the city officials responsible, together with suggestions for the establishment of a uniform speed limit. These measures would be of considerable value to tourists and to residents of Nevada through the factors of safety and convenience.

DRIVERS LICENSE

The Drivers License Division is charged with three principal functions. They are the testing of applicants for driver licenses to determine if they meet minimum requirements of physical and mental ability and to further determine if they have an adequate knowledge of road rules; the maintenance of a central filing system where each driver's operational record is maintained; and the suspension or revocation of licenses when the conduct of the licensee has been such as to constitute a public hazard.

Testing of driver applicants includes screening for color blindness and visual acuity; a check for physical defects such as missing limbs or stiff joints; an inquiry as to defects of the circulatory and nervous systems which might lead to sudden and incapacitating physical attacks; and an inquiry as to addiction to alcohol or narcotic drugs.

Some defects may be a bar to issuance of a license, but persons having defects which may be corrected or compensated may receive a restricted license when the issuance of such license would not be inimical to the public safety.

A test on road rules has been revised during the past biennium to conform more closely to every-day safe driving practices and the

number of questions per examination has been increased from 10 to 20. A road test in actual driving practice is also given.

The maintenance of a central filing system permits the compilation of a driving history of each licensee. The habitual violator of motor vehicle laws and the accident-prone driver can be detected in this manner and adequate steps taken to safeguard the public. Through the cooperation of the various States, violations of traffic laws occurring outside the boundaries of the State wherein the offender is licensed are reported to the State of issuance. This permits a complete record on the subject driver.

Suspension or revocation of a license may be ordered when a licensee has proven, by his record, to be a menace. Such orders may arise through court action or by initiative of the division. Upon suspension or revocation of a license a copy of the directing order is forwarded by registered mail to the licensee with similar copies to the police department, Sheriff's office, and State Police of the licensee's domicile. Statistical information concerning such suspensions and revocations may be found in the Appendix.

During the past biennium the division has endeavored to amplify and extend the cooperation existing between the division, the courts, and enforcement officers. The ultimate success of a driver-licensing program must rest upon enforcement.

Assistance has also been extended in educational programs on motor vehicle safety. Speakers have been supplied for various organizations, either singly or in cooperation with the safety division of the Department of Highways. A participating instructor has assisted in the driving-instructor courses at the summer session of the University of Nevada and assistance has been given in the driver-training programs in our high schools.

Every effort has been made to maintain expenditures within the limit of receipts from licenses. As an example, the division utilizes comparatively slack periods to type renewal licenses, far in advance of renewal periods, to eliminate the necessity for hiring numbers of extra employees during the renewal rush.

It may be worthy of note that in 1946 the drivers-license division of the Nevada Department of Highways was rated by the National Safety Council as the fifth best in the United States and the second best in the western section of the country. In 1947 the same organization awarded a plaque to Nevada for outstanding achievement in drivers-license administration.

Suggested changes in the driver-license law will be found in a preceding section dealing with recommendations.

SAFETY

Safety education and the inculcation of proper and safe highway usage was declared by the 1941 Legislature to be within the purview of the Department of Highways. The Safety Division of the department, working closely with the President's Highway Safety Committee, the Governor's Highway Safety Committee, and other groups interested in safety, has assisted in the common effort to reduce the appalling total of traffic deaths and injuries.

Considerable time and effort have been devoted to establishing

driver-training programs and educational courses in our schools. During the 1947–1948 biennium, marked progress was made in installing driver-training classes in high schools throughout the State. During the 1947–1948 school year classes were conducted in Reno, Carson City, Sparks, Fallon, Las Vegas, and Hawthorne high schools. The Hawthorne class was under the direction and supervision of the United States Navy. Through the courtesy and cooperation of various automobile dealers, cars are now being secured without cost to the schools except for insurance and gas and oil. Definite results from this program may not be available for some time, but it is reasonable to assume that experience in Nevada will follow that of other driver-training programs where a decided lesser incidence of accidents has been reported among trained drivers.

In conjunction with the driver-training program, the Safety Division established and operated an instructor's training course at the past two University of Nevada summer sessions where teachers throughout the State became qualified to act as instructors in their respective schools.

Safety films have been shown to younger students, and poster and safety campaigns initiated. Appearances are made before all organized groups, such as service clubs desiring a speaker or the use of educational films.

Highway accident and analysis sheets are maintained by the division for the use of the engineering section, and recommendations are made on signing and striping. All accident statistics are compiled by the division and a photographic file of accidents kept when such pictures are available.

DIVISION ONE

Division One maintains headquarters in Las Vegas and contains approximately 513 miles of highway.

Two major contracts were completed during the past biennium. The Paradise Valley feeder road was graded, graveled, and oiled at a cost of $90,647 and Main and Bonanza Streets in Las Vegas were converted to four lanes at a cost of $229,006, using Federal funds.

The construction of the Crystal Springs-Hiko section is now under contract at an estimated cost of $104,320 and the construction of seven concrete bridges to replace eight timber bridges on U S 91 has been advertised. This work, together with the proposed construction of the Charleston Street underpass, should be under way in the coming biennium.

Total costs of contracts completed and now under contract amount to $423,973. The cost of the proposed bridges and Charleston underpass will approximate $1,000,000.

General maintenance has been on a larger scale than in previous years. An unusually light cloudburst damage toll enabled crews to concentrate on other needed repairs.

Maintenance operations were aided by the addition of new equipment designed to eliminate handwork and thus speed up slow and expensive operations. The purchase of a Cedar Rapids gravel plant, first used in this division, permitted production of 6,000 tons of chips for resurfacing pavements which were beginning to deteriorate. Approximately 25 miles of highway has received an application of

asphalt and chips. The stockpile of remaining chips will be used in the future.

Other new units have added materially to efficient maintenance. They include four tractor type loaders on pneumatic tires, a large roller, a double drum hoist used for cleaning of pipe culverts, and a Woods preparizer, which may be transferred from place to place, was first used in this division. It scarifies and pulverizes old oil surfaces in preparation for remixing and has cut former costs 25 to 75 percent depending on consistency of the old material.

Twenty miles of roadway received a surface treatment of asphalt and cinders and enough cinders were stockpiled for an additional thirty miles. An excellent cinder pit is in the vicinity of Beatty. This work was done under specific and construction authorizations totaling $76,210.79 of which $4,302.39 was used for improvements to the Las Vegas shops.

DIVISION TWO

Division Two with headquarters in Reno, located on the second floor of the Washoe County Library Building, includes that portion of the State highway system within Churchill, Douglas, Lyon, Ormsby, Storey, Washoe, and portions of Lander, Mineral, and Pershing Counties, a total of 817.81 miles.

All construction in Division Two this biennium was on secondary routes with the exception of two contracts. One of these was Humboldt House to Mill City on U S 40, which was started in 1946 and completed in July of 1947. The other contract, from 6.5 miles north of Minden to Carson City on U S 395 was started March 8, 1948, and was still under construction at the end of the biennium. The Forest Service has under construction a portion of our Mt. Rose highway, State Route 27, from Sky Tavern or the Ski Bowl, to the Mt. Rose dude ranch, a distance of 5.165 miles; this project is being supervised by the Public Roads Administration.

The Federal-aid secondary contracts were as follows:

Pershing County, Lower Valley of Lovelock.

Douglas County, south of Walley's Hot Springs to junction with U S 395 north of Minden and from junction U S 395 north of Minden to Tahoe-Douglas airport.

Ormsby County, Curry Street in Carson City to Kings Canyon Creek.

Washoe County, junction U S 395, 4½ miles south of Reno thence via Holcomb-Huffaker Lanes to Junction U S 395, 3½ miles south of Reno.

Washoe County, Reno east city limits to Glendale, also bridges and approaches over the Truckee River.

Washoe County, north boundary Pyramid Lake Indian Reservation to 10 miles north. This latter project was an experiment in that all grading, ditches, etc., were handled on an equipment rental basis; all other items were under the usual contract specifications. Due to the material and site of the contract the rental basis proved very satisfactory.

Maintenance, beyond the regular routine, consisted of some forty miles of roadway being resurfaced by placing a premix asphaltic

material over the old broken or worn surface with the thickness of the new material depending on the base and condition of the old surface. Also, an additional eighty miles of road have been sealed and sanded.

New maintenance houses have been built at Eastgate and Peterson's Station. These new structures replaced the old houses which were made from uninsulated one room structures nailed together. The winters in these sections are very severe and additional warmth and protection from the elements were needed for our employees.

DIVISION THREE

Division Three maintains, from its headquarters at Elko, approximately 700 miles of road. During the biennium 134 miles of highway were constructed and 29 miles were under construction at the close of the period, at a cost of $4,480,395. Local maintenance crews improved 135 miles of highway during the same period at a cost of $120,419.

An itemization of new construction shows 85.92 miles of plantmix surface, 47.72 miles of roadmix surface, and 20.39 miles of roadmix shoulders. Two grade separation structures were widened during the period. Maintenance crews reconditioned 19.60 miles of road, sealed 108.63 miles, and sealed and placed screenings on 6.45 miles.

Construction projects were located as follows:

Humboldt County, 5.7 miles, east foot of Golconda Summit to near Stonehouse, grade and plantmix.

Humboldt and Lander Counties, 20.39 miles, 5.7 miles east of east foot of Golconda Summit to one-half mile east of Battle Mountain, 8-foot shoulders roadmixed.

Lander County, 18.9 miles, 0.75 mile east of Battle Mountain to 0.8 mile west of Lander-Eureka County line, grade and plantmix.

Eureka County, 14.13 miles, 0.8 miles west of Eureka-Lander County line to 10 miles east of Dunphy, grade and plantmix. Two grade separation structures were widened on this project and sidewalks on the Humboldt River bridge eliminated. Two contracts were let on this particular stretch at a total cost of $916,894.

Eureka County, 9.6 miles, 10 miles east of Dunphy to 4.5 miles east of Emigrant Pass. A temporary surface which had been in use since 1943 was replaced by 4.5 miles of this project.

Elko County, 16.02 miles, 16 miles east of Elko to Deeth, grade and plantmix.

Elko County, 6.4 miles, 10 miles east of Wells to foot of Pequop Summit, plantmix.

Elko County, 10.13 miles, Wells to 10 miles east, grade and roadmix. Completion of 48 percent as of June 30, 1948.

Elko County, 4.9 miles, Pequop Summit to one mile west of Oasis, plantmix. Completion of 40 percent on June 30, 1948.

Humboldt County, 13.72 miles, from junction with U S 40 approximately 3 miles east of Golconda north to Redhouse, grade and roadmix. Completion of 54 percent on June 30, 1948.

Three contracts were awarded in June of 1946 which were started and completed in this biennium. They were Lander County, 10.3 miles, from 9.3 miles east of Battle Mountain to Lander-Eureka County line; Humboldt County, 14.9 miles, Route 8A-A from junction of

U S 95 to Sodhouse; and Elko County, 19.05 miles, Route 46 between Elko and 1 mile east of Lamoille.

The purchase of new equipment to replace obsolete units has greatly aided maintenance operations during the two-year period. Motor patrols have been assigned to each maintenance section with the result that weeds have been kept down, shoulders are in better condition, and wear and tear on the equipment occasioned by long moves has been eliminated.

Four scoopmobiles, now in use, permit the removal of excess material in roadway ditches at a substantial saving and speed up loading of trucks for sanding during oiling operations.

A purposeful effort has been made to replace old and obsolete signs with new Scotchlite as a safety factor in handling increased traffic. Traffic striping has been applied to two-thirds of the division's hard-surfaced roads.

Future planned improvements include additional living quarters at North Fork and Pequop maintenance stations and storage sheds at all outside maintenance stations. A new headquarters office building and shop building is also contemplated.

DIVISION FOUR

Division 4, with headquarters at East Ely, includes the State highway system in White Pine County and in portions of Elko, Eureka, Lander, Lincoln, and Nye Counties for a total of 866.028 miles of highway. This total includes 700.3 miles of asphaltic roadmix surface and 165.7 miles of gravel surface.

During the biennium 27.07 miles of Federal-aid roads were completed with roadmix asphaltic surfaces and 22.5 miles were under contract to be completed in the calendar year of 1948. On the secondary system 90.46 miles of road were graded, drained, and surfaced with gravel. Contracts to be completed on the secondary system include 2.26 miles of grade, drain, gravel, and roadmix surface; 23.99 miles grade, drain, and gravel surface; and 37.19 miles of roadmix asphaltic surface only. Two contracts were nearing completion for reconstruction of 23.5 miles on U S 50 in Lander County under the Public Roads Administration.

The various contracts included in the foregoing and the counties wherein they are located are as follows: White Pine, 9.40 miles, Sacramento Pass to Baker Junction, roadmix; White Pine, 16.96 miles, Baker Junction to Utah line near Garrison, Utah, and Baker to Lehman Caves, gravel (separate contract for oiling subsequently let); Lincoln, 15.09 miles, Pioche to Ursine, gravel; Eureka, 2.66 miles, Richmond-Eureka Mine to Eureka, roadmix; White Pine, 23.99 miles, junction U. S. 50 east of Eureka to Strawberry, gravel; White Pine, 15.21 miles, Magnuson's Ranch north, roadmix; Eureka, 20.23 miles, junction U S 50 to Garden Pass, roadmix; White Pine 7.29 miles, Baker Junction to Utah line on U S 6, roadmix; Eureka (two projects by Public Roads Administration), 10 miles from 20 to 30 miles east of Austin and 13.5 miles from 5 to 18.5 miles west of Austin.

Excluding headquarters, there are ten maintenance stations in Division 4. Each station has a foreman and one or two helpers with the mileage maintained varying from 50 to 90 miles. Ninety miles of

roadway, leading in four directions from Ely, are maintained by headquarters. A swing crew takes care of sealing, reconditioning, flood control, extra heavy snow removal, and other heavy work which may be required.

Snowfall, with two exceptions, has been light during the subject biennium. A fall of 28 inches was recorded on Sacramento Pass and the Baker district, and 40 inches, a new record, at Caliente and Caliente Summit.

A heavy seal and chips have been applied to approximately 24 miles on U S 50 in White Pine County, 37 miles on U S 93, south of Ely, and 20 miles on U S 6, east of Connors Pass. Nine miles of roadmix surface on U S 50 have been scarified, remixed, and relaid, and 1½ miles have received new gravel and roadmix surface.

Equipment, at the end of the biennium, is sufficient and in good condition. All major equipment repair jobs are handled in the equipment repair shop maintained in East Ely. A paint shop is maintained with one sign painter and a helper. The shop is charged with the repair, construction, removal, and replacement of signs and with all painting throughout the division.

Considerable improvement work has been completed on maintenance stations. At Currie station one room and a bath were added to the dwelling house and the garage was lined. At Ferguson Springs a bath was added to the helper's house. At Schellbourne both residences were repainted and the garage lined. At Geyser station a room and bath were added to one residence and the exterior of both residences lined with asbestos shingles. The garage was lined with Celotex. Construction of a new maintenance station in the vicinity of Sacramento Pass is contemplated.

DIVISION FIVE

Division 5, with headquarters in Tonopah, maintains approximately 638 miles of highways. During the biennium the increasing availability of labor, equipment, and materials enabled the division to bring to standard the major part of the maintenance work that had been postponed during the war years.

Over 600,000 gallons of asphaltic material were used in seal coating 239 miles, seal coating with chips on 36 miles, and in reconditioning 3 miles. Other work completed in the division included 355 miles of center striping and widening and regraveling 30 miles on Route 3A in Fish Lake Valley. Five miles of cuts and fills were widened north of Tonopah to alleviate bad snow conditions and one-half mile on U S 95 near Redlick Summit was realigned as a safety measure. A steady water supply for Basalt maintenance station was insured with the addition of two springs and repair of the existing pipe line.

During the early part of the biennium cloudbursts at Lida on Route 3, Rattlesnake on U S 6, and Gabbs on Route 23, caused damage amounting to $28,000. In the latter part of the biennium minor washouts cost only $2,600.

Two contracts were completed during the biennium. A gravel surface highway was completed from Round Mountain junction on State Route 8A for 21.68 miles north. On State Route 3A in Fish Lake Valley 29.87 miles of roadmix were completed. Under construction at

the end of the biennium was a project on State Route 31, 25 miles south of Hawthorne.

Additional and replacement equipment received by the division included 3 pickups, 15 light dump trucks, 2 heavy dump trucks, 1 tractor truck and low bed semitrailer, 1 Hough loader, 2 D7 tractors with bulldozers, one carryall scraper, and 3 motor patrols.

APPENDIX

TABLE NO. 1
STATEMENT OF RECEIPTS

Classification	1917–1946	1947	1948	Total	Percentage
Legislative appropriation	$40,000.00			$40,000.00	.04
State tax levy	1,869,468.87			1,869,468.87	1.79
Auto license fees (net)	4,364,033.79	$413,148.51	$422,736.42	5,199,918.72	4.97
Gasoline and use fuel tax (gross)	22,035,484.01	2,401,528.61	2,609,593.15	27,046,605.77	25.87
Common carrier license	4,056,359.70	540,648.69	635,471.44	5,232,479.83	5.00
Driver's license	228,021.48	59,670.25	44,154.35	331,846.08	.32
Certificate of title	44,509.05			44,509.05	.04
Racing commission fees	147,428.86			147,428.86	.14
Contractor's license	16,234.23			16,234.23	.01
Miscellaneous	1,036,518.97	43,531.10	67,815.14	1,147,865.21	1.10
State highway bonds	1,900,000.00			1,900,000.00	1.82
Federal construction refunds	50,814,523.12	3,204,712.30	2,761,376.93	56,780,612.35	54.31
County construction refunds	4,118,085.75			4,118,085.75	3.94
County refunds on State maintenance	59,000.00			59,000.00	.06
County maintenance refunds	116,654.73			116,654.73	.11
Lincoln Highway Association construction refunds	71,426.60			71,426.60	.07
Utah-Nevada-California Association construction refunds	23,831.47			23,831.47	.02
San Francisco-Bay City construction refunds	25,000.00			25,000.00	.02
City construction refunds	212,553.41	5,833.83		218,387.24	.21
Railway-crossing construction refunds	169,088.30			169,088.30	.16
	$91,348,222.34	$6,669,073.29	$6,541,147.43	$104,558,443.06	100.00
Advances to State by U. S. Government—					
Deposited to National Industrial Recovery Highway Fund—Trust Account*	600,000.00			600,000.00	
Deposited to Trust Account Defense Highway Act of 1941*	600,000.00			600,000.00	
	$92,548,222.34	$6,669,073.29	$6,541,147.43	$105,758,443.06	

*These advances repaid to U. S. Government.

TABLE NO. 2
STATEMENT OF DISBURSEMENTS

Classification	1917–1946	1947	1948	Total	Percentage
Highway construction	$62,632,699.17	$4,884,494.19	$4,598,673.02	$72,115,866.38	69.48
Surveys, plans, right-of-way, and preliminary engineering	3,608,458.36	273,327.10	351,039.58	4,232,825.04	4.08
Maintenance	13,739,498.54	1,051,422.22	1,195,746.18	15,986,666.94	15.41
County maintenance	114,846.29			114,846.29	.11
Equipment division and plants	1,851,767.37	750,334.07	302,514.20	2,904,615.64	2.80
Maintenance buildings	191,933.56	29,106.56	43,344.30	264,384.42	.25
Accounts receivable	928,193.41	42,561.17	79,818.68	1,050,573.26	1.01
Section "31" refunds	40,107.17			40,107.17	.04
County highway bond redemption	232,168.01			232,168.01	.22
Laboratory building	21,642.18			21,642.18	.02
General administration	2,431,997.96	206,594.12	218,012.29	2,856,604.37	2.75
Highway bulletin and publicity	64,117.44	11,238.45	22,702.76	98,058.65	.09
Public relations			2,358.98	2,358.98	
Road information	21,753.56	2,924.78	3,337.35	28,015.69	.03
Landscape-architect department	15,097.01			15,097.01	.01
Roadside improvement	4,749.91	4.13		4,754.04	
Special highway traffic count	110,285.29	12,584.63	15,255.98	138,125.90	.13
Safety division	35,103.22	3,404.75	13,797.05	52,305.02	.05
Traffic and sign department (headquarters)	56,653.30	9,691.35	2,422.55	68,767.20	.07
Sign division (Reno)	158,427.14	15,247.12	2,353.79	176,028.05	.17
Pavement striping	144,215.17	47,484.35	60,279.43	251,978.95	.24
Driver's license division	227,877.70	60,451.54	66,773.01	355,102.25	.34
Police patrol (highway)	341,623.60			341,623.60	.33
Common carrier license expense	85,905.09			85,905.09	.08
Public service commission inspectors	259,784.71	59,286.59	64,334.56	383,405.86	.37
Common carrier and truck refunds	26,711.21	864.85	928.30	28,504.36	.03
Gasoline tax refunds	1,474,776.73	169,719.25	188,841.68	1,833,337.66	1.77
Gasoline tax administration	60,738.42	9,780.71	11,767.70	82,286.83	.08
Use fuel tax administration	33,785.84	6,060.15	6,424.84	46,270.83	.04
	$88,914,917.36	$7,646,582.08	$7,250,726.23	$103,812,225.67	100.00
Transfer to Revolving Fund	52,452.02			52,452.02	
Transfer to U. S. Treasurer from National Industrial Recovery Highway Fund—Trust Account	600,000.00			600,000.00	
Transfer to U. S. Treasurer from Trust Account—Defense Highway Act of 1941	500,000.00	100,000.00		600,000.00	
	$90,067,369.38	$7,746,582.08	$7,250,726.23	$105,064,677.69	

Reconcilement—	
Total receipts	$105,758,443.06
Total disbursements	105,064,677.69
State Highway balance July 1, 1948	$693,765.37
Lists filed July 5 and 20, 1948 included in disbursements	688,516.33
State Controller's balance July 1, 1948	$1,382,281.70

TABLE NO. 3
STATEMENT OF RECEIPTS AND DISBURSEMENTS FOR THE PERIOD JULY 1, 1946, TO JUNE 30, 1948

Receipts	1947	1948	Total	Percentage
Federal aid	$3,204,712.30	$2,761,376.93	$5,966,089.23	45.16
County and others	5,833.83		5,833.83	.04
Miscellaneous	43,531.10	67,815.14	111,346.24	.84
Gasoline and use fuel tax (gross)	2,401,528.61	2,609,593.15	5,011,121.76	37.93
Auto license fees (net)	413,148.51	422,736.42	835,884.93	6.33
Common carrier license	540,648.69	635,471.44	1,176,120.13	8.91
Driver's license	59,670.25	44,154.35	103,824.60	.79
	$6,669,073.29	$6,541,147.43	$13,210,220.72	100.00
Disbursements				
General administration	$206,594.12	$218,012.29	$424,606.41	2.85
Special traffic surveys	12,584.63	15,255.98	27,840.61	.19
Road information	2,924.78	3,337.35	6,262.13	.04
Roadside improvement	4.13		4.13	
Highway bulletin and publicity	11,238.45	22,702.76	33,941.21	.23
Public relations		2,358.98	2,358.98	.02
Traffic and sign department (headquarters)	9,691.35	2,422.55	12,113.90	.08
Sign department (Reno)	15,247.12	2,353.79	17,600.91	.12
Pavement striping	47,484.35	60,279.43	107,763.78	.72
Safety division	3,404.75	13,797.05	17,201.80	.12
Driver's license division	60,451.54	66,773.01	127,224.55	.85
Public service commission inspectors	59,286.59	64,334.56	123,621.15	.83
Gas tax refunds	169,719.25	188,841.68	358,560.93	2.41
Gasoline tax administration	9,780.71	11,767.70	21,548.41	.14
Use fuel tax administration	6,060.15	6,424.84	12,484.99	.08
Common carrier refunds	864.85	928.30	1,793.15	.01
Maintenance work	1,051,422.22	1,195,746.18	2,247,168.40	15.08
Surveys, plans, right-of-way, etc.	273,327.10	351,039.58	624,366.68	4.19
Equipment division and plants	750,334.07	302,514.20	1,052,848.27	7.07
Maintenance buildings	29,106.56	43,344.30	72,450.86	.49
Highway construction	4,884,494.19	4,598,673.02	9,483,167.21	63.66
Miscellaneous	42,561.17	79,818.68	122,379.85	.82
	$7,646,582.08	$7,250,726.23	$14,897,308.31	100.00

TABLE NO. 4
FEDERAL AID ALLOTMENTS

1921 and prior—regular	$3,527,276.18
1922 Regular	953,436.78
1923 Regular	635,624.52
1924 Regular	826,360.27
1925 Regular	947,623.25
1926 Regular	956,576.00
1927 Regular	948,318.00
1928 Regular	948,510.00
1929 Regular	957,995.00
1930 Regular	960,375.00
1930 Public lands	588,914.00
1931 Regular	1,601,408.00
1931 Unused portion Hawaii allotment	4,288.00
1931 Advance	904,961.83
1932 Regular	1,598,987.00
1932 Public lands	440,683.00
1933 Regular	1,421,688.63
1933 Emergency	1,575,756.00
1934 National recovery	4,545,917.00
1935 National recovery	2,302,356.00
1935 Public lands	542,125.00
1936 Regular	1,595,501.00
1936 Public lands	553,135.00
1936 Works program highway	2,243,074.00
1936 Works program grade-crossing elimination	887,260.00
1937 Regular	1,593,978.00
1938 Regular	1,632,385.00
1938 Secondary highways	326,477.00
1938 Grade-crossing elimination	250,000.00
1938 Public lands	560,201.00
1939 Regular	1,590,172.00
1939 Secondary highways	318,034.00
1939 Grade-crossings	243,750.00
1939 Public lands	559,895.00
1940 Regular	1,275,938.00
1940 Secondary highways	191,391.00
1940 Grade-crossings	97,500.00
1940 Public lands	212,442.00
1940 Regular (reapportioned from other States)	6,718.00
1940 Secondary (reapportioned from other States)	690.00
1940 Grade-crossing (reapportioned from other States)	781.00
1941 Regular	1,462,071.00
1941 Secondary highways	190,705.00
1941 Grade-crossings	146,250.00
1941 Public lands	436,062.00
1941 Regular (reapportioned from Georgia)	4,919.00
1941 Secondary (reapportioned from Georgia)	738.00
1941 Grade-crossing (reapportioned from Georgia)	358.00
1942 Regular	1,274,718.00
1942 Secondary highways	223,076.00
1942 Grade-crossings	97,500.00
1942 Public lands	310,692.00
1943 Regular	1,275,386.00
1943 Secondary highways	223,193.00
1943 Grade crossings	97,500.00
1943 Strategic net	318,847.00
1943 Advance engineering	127,539.00
1946 Regular	2,868,043.00
1946 Secondary highways	1,921,867.00
1946 Urban	60,613.00
1947 Regular	2,868,649.00
1947 Secondary highways	1,922,269.00
1947 Urban	60,613.00
1948 Regular	2,829,804.00
1948 Secondary highways	1,896,250.00
1948 Urban	59,836.00
	$62,005,999.46

OTHER FEDERAL FUNDS UTILIZED

Access funds	$1,958,757.90
Flight strips (general)	568,375.00
Flight strips (special)	629,621.09
Subtotal	$3,156,753.99
Total	$65,162,753.45

TABLE NO. 5

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON ALL ROADS MAINTAINED BY THE DEPARTMENT, FISCAL YEAR ENDING JUNE 30, 1947.

Operation	Expenditures	Percentage
Building and repairing shoulders	$126,221.84	12.0049
Filling expansion joints and cracks and patching surfaces	231,375.23	22.0059
Cleaning ditches and culverts	68,231.51	6.4894
Cutting weeds and brush	93,918.08	8.9325
Dragging and blading (graded and gravel roads)	27,358.80	2.6020
Repairing surface ditches	6,399.82	.6087
Raking rocks	1,994.23	.1897
Signs and markers	19,629.62	1.8670
Removing slides and trimming slopes	59,342.43	5.6440
Washouts	84,197.56	8.0080
Hauling and spreading patching material	2,254.42	.2144
Snow removal	79,222.34	7.5348
Guard rail	4,974.19	.4730
Riprapping and protecting slopes	1,767.85	.1681
Removing debris and waste material along right-of-way	21,642.53	2.0584
Building and repairing culverts	2,665.96	.2536
Reconditioning	10,194.52	.9696
Building and repairing fences and gates on right-of-way	3,161.16	.3007
Painting traffic and center lines	47,623.17	4.5294
Snow fence	2,904.20	.2762
Sand fence	56.96	.0054
Maintenance of houses, A-C	47,495.98	4.5173
Seal coating	33,413.86	3.1780
New road approaches	7,253.76	.6899
Landscape	10,919.69	1.0386
Flattening slopes	736.79	.0701
Sanding icy roads	18,119.22	1.7233
Rent, heat, light, etc., of garages, storage sheds, etc.	9,091.91	.8647
Maintenance of roadside parks	2,077.09	.1976
Bridge maintenance	9,071.84	.8628
Total direct expenditures	$1,033,316.56	98.2780
Administration (headquarters)	18,105.66	1.7220
Total	$1,051,422.22	100.0000
Average cost of maintenance per mile	321.23	

TABLE NO. 6

MILEAGE OF ROADS MAINTAINED, BY ROAD TYPES, FISCAL YEAR ENDING JUNE 30, 1947

		Miles	Percent
1. Graded Earth—			
Unimproved	48.791		
Graded and drained	19.126	67.917	2.08
2. Gravel	———	272.673	8.33
3. Mixed Bituminous—			
Road mix	2352.144		
Plant mix	484.651	2,836.795	86.67
4. Other Hard Surface—			
Portland cement concrete	7.711		
Bituminous concrete	22.992		
Combination	12.220		
Bituminous surface treated	32.434		
Bituminous penetration retread	20.349	95.706	2.92
Total mileage		3,273.091	100.00

TABLE NO. 7

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON ALL ROADS MAINTAINED BY THE DEPARTMENT, FISCAL YEAR ENDING JUNE 30, 1948

Operation	Expenditures	Percentage
Building and repairing shoulders	$144,965.60	11.5416
Filling expansion joints and cracks and patching surfaces	235,667.68	18.7630
Cleaning ditches and culverts	79,977.37	6.3675
Cutting weeds and brush	97,848.59	7.7903
Dragging and blading (graded and gravel roads)	38,091.78	3.0327
Repairing surface ditches	8,951.41	.7127
Raking rocks	3,980.27	.3169
Signs and markers	86,048.89	6.8509
Removing slides and trimming slopes	56,025.64	4.4605
Washouts	12,315.97	.9806
Hauling and spreading patching material	5,342.02	.4253
Snow removal	106,459.56	8.4759
Guard rail	6,554.58	.5219
Riprapping and protecting slopes	5,232.58	.4166
Removing debris and waste material along right-of-way	27,557.65	2.1940
Building and repairing culverts	3,924.73	.3125
Reconditioning	5,978.82	.4760
Building and repairing fences and gates on right-of-way	4,766.01	.3795
Painting traffic and center lines	66,885.11	5.3251
Snow fence	3,277.83	.2610
Sand fence	43.15	.0034
Maintenance of houses, A-C	41,434.15	3.2988
Seal coating	132,173.04	10.5231
New road approaches	655.60	.0522
Landscape	10,782.63	.8585
Flattening slopes	15,819.41	1.2595
Sanding icy roads	21,176.10	1.6860
Rent, heat, light, etc., of garages, storage sheds, etc.	13,233.01	1.0536
Maintenance of roadside parks	1,959.82	.1560
Bridge maintenance	6,104.64	.4860
Total direct expenditures	$1,243,233.64	98.9816
Administration (headquarters)	12,791.97	1.0184
Total	$1,256,025.61	100.0000
Average cost of maintenance per mile	367.07	

TABLE NO. 8

MILEAGE OF ROADS MAINTAINED, BY ROAD TYPES FISCAL YEAR ENDING JUNE 30, 1948

		Miles	Percent
1. Graded Earth—			
Unimproved	29.067		
Graded and drained	1.689	30.756	.90
2. Gravel	———	328.606	9.60
3. Mixed Bituminous—			
Road mix	2,442.018		
Plant mix	525.424	2,967.442	86.72
4. Other Hard Surface—			
Portland cement concrete	7.120		
Bituminous concrete	23.009		
Bituminous penetration	20.940		
Combination	12.341		
Bituminous surface treated	30.928		
Bituminous penetration retread	.005		
Bridges, overpasses, and underpasses, PCC	.577		
Bridges, timber	.023	94.943	2.78
Total mileage		3,421.747	100.00

TABLE NO. 9
MAINTENANCE COSTS FROM 1918–1948

	Mileage			Mileage	
1918		$16,596.54	1933	2,151.64	$566,845.41
1919		29,330.21	1934	2,287.37	502,715.66
1920		44,323.34	1935	2,524.77	617,784.47
1921		33,601.26	1936	2,656.68	675,726.06
1922		61,997.55	1937	2,697.82	846,033.35
1923	442.98	110,724.87	1938	2,770.20	756,305.26
1924	765.23	122,788.60	1939	2,805.90	830,877.69
1925	903.90	215,168.70	1940	2,908.48	763,075.33
1926	1,213.43	306,899.52	1941	2,941.22	774,573.50
1927	1,445.08	343,399.28	1942	3,015.76	848,789.57
1928	1,680.73	359,262.08	1943	3,047.80	745,480.25
1929	1,875.16	418,065.08	1944	3,084.67	703,340.85
1930	1,905.43	500,752.46	1945	3,081.740	773,778.26
1931*	2,061.34	301,166.64	1946	3,093.242	855,194.89
1932	2,113.02	618,377.41	1947	3,273.091	1,051,422.22
			1948	3,421.747	1,256,025.61

*Seven months' expenditures, December 1, 1930, to June 30, 1931.

TABLE NO. 10
SNOW–REMOVAL COSTS, 1923–1948*

1923	$12,695.38	1936	$50,948.37
1924	884.53	1937	131,066.03
1925	1,479.13	1938	59,468.88
1926	1,803.43	1939	71,681.97
1927	8,228.95	1940	42,403.61
1928	3,167.50	1941	57,008.71
1929	16,172.05	1942	87,357.42
1930	19,466.28	1943	60,386.97
1931	4,711.45	1944	94,585.25
1932	83,632.96	1945	103,521.25
1933	83,497.61	1946	104,222.71
1934	8,227.13	1947	102,053.10
1935	28,573.76	1948	130,913.49

*Snow-removal costs prior to 1923 not available.

TABLE NO. 11

CONTRACTS AWARDED BY STATE JULY 1, 1946, TO JUNE 30, 1947

Contract No.	County	Length (miles)		Type construction and termini	Bid amount	Route
673	Lander	38.45	24	feet gravel surface, includes one concrete and steel bridge—Jct. U S 50 near Austin to 38 miles north	$385,937.00	8A
674	Eureka	20.23	24	feet type 2 gravel—Jct. U S 50 near Eureka to Garden Pass	193,051.00	20
675	Eureka	9.08	32	feet and 40 feet roadbed; 24 feet plantmix; 4 feet to 10 feet roadmix shoulders—0.3 mile east of Dunphy to approximately 10 miles east	638,136.90	1 (U S 40)
676	Humboldt	5.68	40	feet roadbed; 24 feet plantmix; 8 feet roadmix shoulders—East foot of Golconda Summit to Stonehouse	239,514.00	1 (U S 40)
677	Pershing	5.15	24	feet roadbed; 24 feet roadmix surface—Jct. U S 40 near Perth, southerly to the Lower Valley District, with spur connection to FAS Road 691, and along FAS Road 691 to a point 1 mile east	87,042.89	FAS 691, 692, 697
678	Lander and Eureka	5.06	40	feet roadbed; 24 feet plantmix; 8 feet roadmix shoulders; includes widening Dunphy and Shoshone overpasses—0.8 mile west of Lander-Eureka County Line to 0.3 mile east of Dunphy	364,659.15	1 (U S 40)
679	Douglas	4.43	24	feet roadbed; 24 feet roadmix surface; includes four reinforced concrete bridges—0.75 mile south of Walleys Hot Springs to Jct. U S 395, 1.20 miles north of Minden and Jct. U S 395, 3.2 miles north of Minden to the Tahoe-Douglas Airport	149,848.91	19, FAS 558
680	Contract was not awarded.					
681	Elko	19.05		Includes roadmix surfacing 5.83 miles; 26 feet width, 6.11 miles; 24 feet width and complete construction 7.12 miles to 24 feet roadmix—Elko to one-half mile east of Lamoille	264,165.50	46, FAS 572
682	Nye	21.68	24	feet roadbed type 2 base and select material surface—Round Mountain Jct. to Milletts	184,932.17	8A
683	Ormsby	2.05	54	feet city section; 47 feet city section; curbs and gutter, sidewalks and storm sewer; 39 feet transition to 1.61 miles 24 feet, all roadmix—Curry Street in Carson City to Kings Canyon Creek	*75,898.67	FAS 683
684	White Pine	9.40	24	feet roadbed; 24 feet roadmix—Sacramento Pass to Baker Jct.	188,729.39	14 (U S 6)
685	Lander	8.62	40	feet roadbed; 24 feet plantmix; 8 feet roadmix shoulders—Three-quarter mile east of Battle Mountain to 9.3 miles east of Battle Mountain	227,491.76	1 (U S 40)
686	Elko	16.02	40	feet roadbed; 24 feet plantmix; 8 feet roadmix shoulders—One-quarter mile east of the North Fork Bridge to Deeth	635,051.92	1 (U S 40)
687	Washoe	4.53	24	feet roadbed; 24 feet roadmix surface—Jct. U S 395, 4.5 miles south of Reno via Holcomb and Huffaker Lane to Jct U S 395, 3.5 miles south of Reno	99,720.99	FAS 708
688	White Pine	16.96	24	feet roadbed; 24 feet type 2 gravel base—Jct. U S 6 (Baker Jct.) to Nevada-Utah State Line near Garrison, Utah, and Baker to Lehman Caves	174,910.23	73 and 74

CONTRACTS AWARDED BY STATE JULY 1, 1947, TO JUNE 30, 1948

Contract No.	County	Length (miles)	Type construction and termini	Bid amount	Route
689	Lincoln	15.09	40 feet, 36 feet, 24 feet city section roadmix surface; 20 feet type 2 gravel base—Pioche to Ursine	199,139.43	FAS 632
690	Elko	10.13	65 feet and 53 feet city section curb and gutters; 8.60 miles 40 feet; 0.85 mile 44 feet; 0.61 mile 48 feet roadmix, full width—Wells to 10 miles east (Moor)	449,784.33	1 (U S 40)
691	Eureka	5.99	30 feet roadbed; 1½ inches by 24 feet plantmix; 3 feet salvaged roadmix shoulders—10 miles east of Dunphy to three-quarter mile east of Emigrant Pass	109,556.23	1 (U S 40)
692	Eureka	2.66	24 feet roadbed; 24 feet roadmix surface—Richmond-Eureka Mine to Eureka	77,515.59	FAS 604
693	White Pine	23.99	20 feet roadbed; 20 feet type 2 gravel base—Jct. U S 50 approximately 15 miles east of Eureka to Strawberry (Newark Valley)	138,557.00	FAS 578
694	Clark	7.82	24 feet roadbed; 24 feet roadmix surface—Paradise Valley to Las Vegas	90,647.16	FAS 534
695	Douglas	0.05	Removing timber decks and constructing reinforced concrete decks—Improvements of four bridges and one culvert from one mile northwest of Minden to four miles south, and the junction of Rt. 3 (U S 395) to Genoa	14,571.03	FAS 551, 553, 559
696	Washoe	2.92	40 feet city section, curbs, gutters, bituminous foot paths; 36 feet, 38 feet, 40 feet roadmix surface; 24 feet surface country section; 24 feet roadmix surface—Reno east city limits to Glendale	93,678.88	FAS 705
697	White Pine	15.21	32 feet roadbed; 32 feet roadmix surface—Magnusons Ranch to a point 15 miles north of Magnusons Ranch	256,779.22	2 and 24 (U S 50, 93)
698	Humboldt	13.73	4.84 miles 26 feet roadmix surface only; 8.89 miles complete construction; 24 feet roadmix surface and roadbed—Jct. U S 40 (Approximate three miles southeast of Golconda) to Red House Jct.	134,645.40	18, FAS 613
699	Clark	1.07	City street improvement 64 feet, 60 feet, 46 feet, 24 feet, 20 feet bituminous surface, curb, gutters, sidewalks—Main Street (Carson Street to 0.6 mile northeast) Bonanza Road (5th Street to 0.5 mile northwest) in the city of Las Vegas	229,006.49	6, 6A, 5, 5A
700	Washoe	10.19	24 feet roadbed; 24 feet roadmix surface—North boundary Pyramid Lake Indian Reservation to 10 miles north	110,592.36	34
701	Douglas and Ormsby	7.70	7.50 miles 40 feet plantmix, full width 0.20 mile; 40 feet to 56 feet C to C transition, and 52 feet plantmix—6.5 miles north of Minden to Carson City	324,192.04	3 (U S 395)
702	Elko	4.95	1.85 miles 40 feet to 44 feet, and 3.10 miles 48 feet to 54 feet plantmix full width—Pequop Summit to one mile west of Oasis	549,006.86	1 (U S 40)
703	Churchill	5.10	24 feet roadbed; 24 feet roadmix surface—Jct. U S 50 near Fallon to a point five miles east (Stillwater Road)	133,000.43	42 (FAS 501)
704	Esmeralda	29.84	20 feet roadmix surface only—Six miles north of Nevada-California State Line to junction with U S 6 near Coaldale	87,684.70	3A (FAS, 592)
705	Eureka	20.23	24 feet roadbed roadmix surface, full width—A junction with U S 50 near Eureka to Garden Pass	99,405.06	20A (FAS, 602)
706	White Pine	16.89	24 feet roadmix surface only—Jct. U S 6 (Baker Jct.) to Nevada-Utah State Line and Baker to Lehman Caves	70,753.97	73 and 74 (FAS 732, 738)

CONTRACTS AWARDED BY STATE JULY 1, 1947, TO JUNE 30, 1948 (*Continued*)

Contract No.	County	Length (miles)	Type construction and termini	Bid amount	Route
707	White Pine	7.29	24 feet roadbed; 24 feet roadmix surface—Baker Jct. to Nevada-Utah State Line on U S 6	124,023.55	14 25 and 38
708	Lincoln	5.33	24 feet roadbed; 24 feet roadmix surface—Crystal Springs to Hiko	104,320.38	(FAS 634)
709	Washoe	2,115 ft.	Installing vitrified clay sewer pipe—From Reno Equipment Plant in Reno to the Nevada State Hospital for Mental Diseases	4,677.44	
710	Washoe	0.123	Concrete bridges, 40–30 feet curb to curb; 40–28 feet plantmix surface—Truckee River Bridge and approaches near the Nevada State Mental Hospital	95,353.26	FAS 705
711	Mineral	5.00	24 feet roadway; 24 feet roadmix surface—Five miles northeast Nevada-California State Line to a point 22 miles southeast of Hawthorne	211,840.67	31A (FAS 664)
712	Washoe	1.82	Tree removal from proposed right-of-way—On South Virginia Road from one-quarter mile south of Peckham Lane to Mt. Rose Street in Reno	2,444.00	3B (U S 395)

TABLE NO. 12

CONSTRUCTON AND RECONSTRUCTION COMPLETED AND UNDER CONTRACT ON THE DESIGNATED STATE HIGHWAY SYSTEM AT THE CLOSE OF THE BIENNIUM.

Type	Miles new construction completed during biennium	Miles reconstruction completed during biennium	Miles new highway under construction at close of biennium	Miles reconstruction not yet completed at close of biennium	Totals
Gravel	75.29	———	23.99	———	136.40
Roadmix	55.35*	8.62	191.54*	26.41	206.63
Plantmix	0	35.84	———	18.64	54.48
	167.76	44.46	140.24	45.05	397.51

*Includes 16.78 miles roadmix surfacing only; constructed during previous biennium.

TABLE NO. 13
BRIDGE AND GRADE SEPARATION SUMMARY

Type	Structures Built by State Highway Department				Structures on highway system *not* built by State Highway Department	Total structures as of June 30, 1948
	Completed or under construction as of June 30, 1946	Completed during biennium or under construction June 30, 1948	Structures abandoned during biennium	Total as of June 30, 1948		
Plain concrete	4	0	0	4	1	5
Reinforced concrete	76	12	0	88	5	93
Structural steel	27	0	0	27	10	37
Timber	65	0	0	65	17	82
Composite structures (reinforced concrete and structural steel)	11	0	0	11	0	11
Total	183	12	0	195	33	228
Total length of structures in feet	16,599	772	0	17,371	2,432	19,803

TABLE NO. 14
SURVEYS AND RECONNAISSANCE
July 1, 1946, to June 30, 1948

County	Miles
Churchill	6.10
Clark	73.28
Douglas	14.00
Elko	108.61
Esmeralda	40.35
Eureka	2.50
Humboldt	38.00
Lander	10.50
Lincoln	32.18
Lyon	
Mineral	44.42
Nye	12.69
Ormsby	.75
Pershing	6.00
Storey	
Washoe	53.38
White Pine	66.90
Total	509.66

Cost per mile of surveys, July 1, 1946, to June 30, 1948 $557.14

TABLE NO. 15
PLANS COMPLETED
July 1, 1946, to June 30, 1948

County	Construction and reconstruction (miles)	Bituminous surface only (miles)	Bridges (number)
Churchill	5.102		
Clark	11.929		1
Douglas	1.916		6
Elko	50.147	32.640	
Esmeralda		29.840	
Eureka	8.253	20.231	
Humboldt	13.728		1
Lander	*26.685		1
Lincoln	20.421		
Mineral	5.000		
Nye	33.362		
Ormsby	7.879		
Washoe	†17.758		2
White Pine	72.845	16.891	
	275.025	99.602	11

Total cost, plans and estimates, roadway and bridges $243,283.13
Cost per mile 649.40

*Exclusive of 19.110 miles in collaboration with Public Roads Administration.
†Exclusive of 5.165 miles in collaboration with Public Roads Administration.

TABLE NO. 16

LANDS ACQUIRED FROM JULY 1, 1946, TO JUNE 30, 1948

1. For Rights-of-Way—State Highways

Route No.	Acres			Total land cost through private land	Average Land Cost Per Acre	
	Private lands	Government lands	Total		Private	All land
1	609.68	793.05	1,402.73	$4,569.81	$7.50	$3.26
2	44.76	1,244.59	1,289.35			
3	62.99		62.99	15,597.26	247.61	247.61
5	0.30		0.30			
6	0.94		0.94	2,500.00	2,659.57	2,659.57
8A	31.29	2,104.54	2,135.83			
10		36.73	36.73			
13	41.95		41.95	67.79	1.62	1.62
14	4.96	371.45	376.41			
15		3.49	3.49			
17		1.58	1.58			
18	53.12	87.62	140.74	130.00	2.45	0.92
20		693.93	693.93			
25	3.32		3.32			
31		205.37	205.37			
34		502.19	502.19			
38	50.06		50.06			
44	18.52		18.52			
65		12.04	12.04			
73		448.68	448.68			
74		152.42	152.42			
Totals	921.89	6,657.68	7,579.57	$22,864.86	$24.80	$3.02

2. For Rights-of-Way—Secondary Roads Not Designated as State Routes

Secondary Road No.	Acres			Total land cost through private land	Average Land Cost Per Acre	
	Private lands	Government lands	Total		Private	All land
534	57.13	3.68	60.81			
558	7.16		7.16	$812.16	$113.43	$113.43
572	17.52	29.75	47.27	169.39	9.67	3.58
578		1,064.41	1,064.41			
604	13.78	0.99	14.77			
683	3.01		3.01			
689	22.43	577.88	600.31			
692	9.29		9.29	20.00	2.15	2.15
705	1.23		1.23	650.00	528.46	528.46
708	2.17		2.17	30.80	14.19	14.19
709	17.52		17.52	125.00	7.13	7.13
Totals	151.24	1,676.71	1,827.95	$1,807.35	$11.95	$0.99

3. For Maintenance Sites

County	Location	Acres	Cost	Cost per acre
Churchill	Eastgate	0.57		
Ormsby	Carson City	14.71		
Washoe	Galena Creek	0.60	$22.20	$37.00
Washoe	Lawton's	1.19		
White Pine	East Ely	2.79	1,500.00	537.63
Totals		19.86	$1,522.20	$76.65

4. For Material Deposits (Secured From Government Without Cost)

State Route or Feeder Road Number	Acres
1	720
2	500
3	80
5	80
6	80
8A	640
11	40
14	120
15	40
18	80
20	480
22	40
24	200
34	80
43	40
60	40
73	160
77	40
689 (feeder)	200
Totals	3,660

TABLE NO. 17

TOTAL LANDS ACQUIRED TO JUNE 30, 1948, FOR ALL PURPOSES

Rights of way for Route No.	Acres			Total land cost through private land	Average Land Cost Per Acre	
	Private lands	Government lands	Total			
1	7,678.04	9,600.15	17,278.19	$123,613.38	$16.10	$7.15
1A	111.99	1,309.91	1,421.90	100.00	0.89	0.07
1B	744.71	554.71	1,299.42	2,949.70	3.96	2.27
2	913.58	12,906.13	13,819.71	30,761.98	33.67	2.23
2A	525.09	1,704.95	2,230.04	1,415.54	2.70	0.63
2B	128.46	444.50	572.96	380.00	2.96	0.66
3	1,462.20	6,068.14	7,530.34	84,946.98	58.10	11.28
3A	89.69	1,095.24	1,184.93			
4	240.67	7,299.41	7,540.11	156.00	0.65	0.02
5	3,447.90	10,930.57	14,378.47	26,905.69	7.80	1.87
6	417.45	6,390.49	6,807.94	13,670.43	32.75	2.01
7	654.83	10,014.54	10,669.37	5,167.69	7.89	0.48
8	277.21	2,913.02	3,190.23	1,305.03	4.71	0.41
8A	241.15	7,995.47	8,236.62	1,836.99	7.62	0.22
8B	88.23	531.34	619.57			
9	193.02	157.31	350.33	7,845.20	40.64	22.39
10	11.29	578.03	589.32	100.00	8.86	0.17
11	144.95	477.02	621.97	786.64	5.43	1.26
11A	25.13	----------	25.13	1,650.00	65.66	65.66
12	80.42	189.36	269.78			
13	440.78	5,572.57	6,013.35	1,145.06	2.60	0.19
14	41.40	1,290.67	1,332.07	255.42	6.17	0.19
15	7.20	1,054.77	1,061.97			
17	225.44	416.19	641.63	7,926.00	35.16	12.35
18	91.80	230.81	322.61	150.00	1.63	0.46
19	23.14	9.83	32.97			
20	----------	979.43	979.43			
21	52.66	----------	52.66	116.00	2.20	2.20
21B	15.67	----------	15.67			
22	19.95	277.26	297.21			
23	19.38	3,026.76	3,046.14			
24	4.79	6,107.08	6,111.87			
25	8.37	----------	8.37			
26	----------	133.15	133.15			
27	30.17	----------	30.47	950.00	31.18	31.18
29	----------	802.51	802.51			
31	----------	205.37	205.37			
32	17.60	----------	17.60			
33	270.82	370.64	641.46	212.90	0.79	0.33
34	----------	502.19	502.19			
36	12.23	----------	12.23			
37	76.60	----------	76.60	1,367.00	17.85	17.85
38	93.56	301.66	395.22	820.00	8.76	2.07

41	13.86	217.30	231.16			
43	407.18	602.03	1,009.21	940.00	2.31	0.93
44	100.18	120.90	221.08			
46	93.44	241.05	334.49	171.34	1.83	0.51
47	0.50	971.40	971.90			
48	14.34		14.34			
53	6.94	322.37	329.31			
58		597.05	597.05			
59	11.92		11.92			
60		544.47	544.47			
61	12.79		12.79			
62	15.21		15.21			
65	13.46	12.04	25.50			
67	0.67		0.67			
69		244.17	244.17			
73		448.68	448.68			
74		152.42	152.42			
Sub-totals	19,618.36	106,915.09	126,533.45	$317,644.97	$16.19	$2.51
Secondary Roads— (Not on State routes)	152.08	1,679.39	1,831.47	1,807.35	11.88	0.99
Subtotals (all rights-of-way)	19,770.44	108,594.48	128,364.92	$319,425.32	$16.16	$2.49
Maintenance sites	418.53		418.53	16,938.20	40.47	40.47
Flight strips	738.34	1,820.15	2,558.49	1,380.75	1.87	0.54
Material deposits	423.14	25,810.49	26,233.63	1,360.22	3.21	0.05
Totals (all lands)	21,350.45	136,225.12	157,575.57	$339,131.49	$15.88	$2.15

TABLE NO. 18
DESCRIPTION OF FEDERAL AID ROUTES, JUNE 30, 1948

F. A. Road No.	Termini	Mileage[1]
1	From the California-Nevada State line southwest of Verdi via Reno, Fernley, Lovelock, Winnemucca, Battle Mountain, Elko, and Wells to the Nevada-Utah State line at Wendover, Utah	417.077
2	From the California-Nevada State line southwest of Spooner via Carson City, Dayton, Leeteville, Fallon, Austin, Eureka, and Ely to a junction with Federal Aid Road No. 1 near Wendover, Utah	468.019
3	From the California-Nevada State line south of Holbrook via Minden to a point on Federal Aid Road No. 2 approximately three miles south of Carson City, and from another point on Federal Aid Road No. 2 in Carson City via Reno to the Nevada-California State line northwest of Reno with a spur connection from a point near the south city limits of Reno via Wells Avenue to a junction with Federal Aid Road No. 1 in Reno	81.618
4	From the California-Nevada State line southwest of Basalt via Basalt, Coaldale and Tonopah to a point on Federal Aid Road No. 2 in Ely, and from another point on Federal Aid Road No. 2 in East Ely via Connor's Pass and Sacramento Pass to the Nevada-Utah State line enroute to Delta, Utah	305.722
5	From the California-Nevada State line southwest of Jean via Jean to the south city limits of Las Vegas, and via Fifth Street in Las Vegas to Glendale, thence to the Nevada-Arizona State line northeast of Mesquite with an alternate route through Las Vegas via Main street	129.710
6	From the California-Nevada State line south of Searchlight via Searchlight and Railroad Pass to a point on Federal Aid Road No. 5 alternate at Fremont Avenue and Main Street in Las Vegas, and from a point on Federal Aid Road No. 5 at North Fifth Street and Bonanza Road in Las Vegas via Beatty and Goldfield to a point on Federal Aid Road No. 4 in Tonopah, and from a point on Federal Aid Road No. 4 at Coaldale via Mina, Hawthorne and Schurz to a point on Federal Aid Road No. 2 in Fallon, and from a point on Federal Aid Road No. 2 at Leeteville via Hazen to a point on Federal Aid Road No. 1 near Fernley, and from a point on Federal Aid Road No. 1 in Winnemucca via Orovada to the Nevada-Oregon State line at McDermitt with an alternate route through Las Vegas from the intersection of Charleston Boulevard and Fremont Avenue via Charleston Boulevard and Tonopah Drive to the intersection of Tonopah Drive and Bonanza Road, and with a spur from Railroad Pass via Boulder City to the Nevada-Arizona State line at Boulder Dam	526.790
7	From Caliente via Pioche to a point on Federal Aid Road No. 4 at the east foot of Connor's Pass, and from a point on Federal Aid Road No. 2 approximately five miles south of the Elko-White Pine County line via Currie, Wells and Contact to the Nevada-Idaho State line northeast of Contact	252.684
8	From a point on Federal Aid Road No. 7 approximately one mile west of Panaca via Panaca to the Nevada-Utah State line enroute to Modena, Utah	20.912
Total		2,202.532

[1]Surveyed mileage used on roads having unimproved sections. As of June 30, 1948, there remained unimproved mileage as follows: F. A. Route 4—11.100 miles; F. A. Route 6—0.349 mile; and F. A. Route 8—21.970 miles.

TABLE NO. 19

TABLE SHOWING STATUS OF MILEAGE ON THE FEDERAL AID HIGHWAY SYSTEM, FEDERAL AID SECONDARY HIGHWAY SYSTEM, REMAINING STATE HIGHWAYS NOT ON THE FEDERAL AID SYSTEMS, AND THE ENTIRE STATE SYSTEM AS OF DECEMBER 31, 1947.

	FEDERAL AID SYSTEM*			FEDERAL AID SECONDARY SYSTEM*						
				On State Highway System			Not on State Highway System			
County	Improved	Not improved	Total	Improved	Not improved	Total	Improved	Not improved	Total	Total mileage on FAS system
Churchill	152.123		152.123	36.135		36.135	9.794	24.511	34.305	70.440
Clark	276.470	.349	276.819	100.149	17.639	117.788	11.244	9.782	21.026	138.814
Douglas	49.878		49.878	28.850		28.850	1.248	28.350	29.598	58.448
Elko	331.538		331.538	88.293	86.593	174.886	24.793	38.649	63.442	238.328
Esmeralda	115.871		115.871	50.338	6.021	56.359				56.359
Eureka	74.076		74.076	93.803		93.803	2.265	4.400	6.665	100.468
Humboldt	135.293		135.293	46.633	58.978	105.611	.595	9.300	9.895	115.506
Lander	104.025		104.025	85.898	18.800	104.698	17.000	6.300	23.300	127.998
Lincoln	80.231	21.970	102.201	96.361	27.700	124.061	6.305	47.300	53.605	177.666
Lyon	63.587		63.587	119.070	29.884	148.954	4.478	18.900	23.378	172.332
Mineral	107.523		107.523	36.661	55.800	92.461				92.461
Nye	240.274		240.274	144.108	16.600	160.708				160.708
Ormsby	20.648		20.648	2.564	2.736	5.300	4.868	3.100	7.968	13.268
Pershing	75.018		75.018	12.099	1.800	13.899	17.951	3.310	21.261	35.160
Storey				11.736		11.736				11.736
Washoe	90.769		90.769	72.400	42.898	115.298	12.608	32.452	45.060	160.358
White Pine	257.858	11.100	268.958	47.103	25.000	72.103	24.686	58.350	83.036	155.139
Totals	2,175.182	33.419	2,208.601	1,072.201	390.449	1,462.650	137.835	284.704	422.539	1,885.189

	REMAINING STATE HIGHWAY SYSTEM*			ALL SYSTEMS*						
				On State Highway System			Not on State Highway System			
County	Improved	Not improved	Total	Improved	Not improved	Total	Improved	Not improved	Total	Grand total system mileage
Churchill		35.109	35.109	188.258	35.109	223.367	9.794	24.511	34.305	257.672
Clark	29.239	219.559	248.798	405.858	237.547	643.405	11.244	9.782	21.026	664.431
Douglas		10.164	10.164	78.728	10.164	88.892	1.248	28.350	29.598	118.490
Elko	5.200	189.244	194.444	425.031	275.837	700.868	24.793	38.649	63.442	764.310
Esmeralda	22.400	58.300	80.700	188.609	64.321	252.930				252.930
Eureka		116.600	116.600	167.879	116.600	284.479	2.265	4.400	6.665	291.144
Humboldt	26.600	97.225	123.825	208.526	156.203	364.729	.595	9.300	9.895	374.624
Lander		86.700	86.700	189.923	105.500	295.423	17.000	6.300	23.300	318.723
Lincoln	14.800	99.100	113.900	191.392	148.770	340.162	6.305	47.300	53.605	393.767
Lyon	1.150	62.400	63.550	183.807	92.284	276.091	4.478	18.900	23.378	299.469
Mineral		28.750	28.750	144.184	84.550	228.734				228.734
Nye	41.600	270.200	311.800	425.982	286.800	712.782				712.782
Ormsby		3.860	3.860	23.212	6.596	29.808	4.868	3.100	7.968	37.776
Pershing	13.000	154.723	167.723	100.117	156.523	256.640	17.951	3.310	21.261	277.901
Storey		22.730	22.730	11.736	22.730	34.466				34.466
Washoe	80.061	186.667	266.728	243.230	229.565	472.795	12.608	32.452	45.060	517.855
White Pine	8.600	73.750	82.350	313.561	109.850	423.411	24.686	58.350	83.036	506.447
Totals	242.650	1,715.081	1,957.731	3,490.033	2,138.949	5,628.982	137.835	284.704	422.539	6,051.521

*Net travelable mileages used.

TABLE NO. 20
MILEAGE BY SURFACE TYPE AND SYSTEMS AS OF JUNE 30, 1948

Type		Designated State Highway System					
		FA system	FAS system	On remaining State highway system	Total State system	FAS system not on State system	Totals all systems
(A-B)	Primitive and unimproved	11.449	390.260	1,603.786	2,005.495	284.704	2,290.199
(C-D)	Graded and drained, and soil surfaced	----------	.189	111.295	111.484	----------	111.484
(E)	Gravel or crushed stone	21.970	265.729	172.888	460.587	52.106	512.693
(F)	Bituminous surface treated	----------	37.992	----------	37.992	1.054	39.046
(G)	Roadmix or plantmix surface	2,110.031	768.259	66.470	2,944.760	84.675	3,029.435
(H-I)	High type bituminous	42.989	.221	2.489	45.699	----------	45.699
(J)	Portland cement concrete	7.333	----------	.067	7.400	----------	7.400
(M)	Combination surface types	14.829	----------	.736	15.565	----------	15.565
Totals		2,208.601	1,462.650	1,957.731	5,628.982	422.539	6,051.521

TABLE NO. 21

MILEAGE OF RURAL ROADS IN EACH SURFACE TYPE GROUP BY AVERAGE DAILY TRAFFIC VOLUME GROUPS

NEVADA FEDERAL AID SYSTEM, DECEMBER 31, 1947

Average traffic per 24-hour-day	Surface Type										
	Primitive and unimproved (AB)	Graded and drained earth (C)	Soil surfaced and gravel or stone (DE)	Bituminous surface treated (F)	Mixed bituminous (G)	High type bituminous (HI)	Portland cement concrete (J)	Total	Undivided	Divided	Daily vehicle miles
0–9					0.222			0.222	0.222		1.7
10–24	11.100							11.100	11.100		266.4
25–49			12.370					12.370	12.370		494.8
50–99			9.600		97.350			106.950	106.950		8436.3
100–199					651.817	0.057		651.874	651.874		98549.2
200–299					442.094	1.971	0.027	444.092	444.092		106061.2
300–399					168.543	1.000		169.543	169.543		55580.0
400–499					11.102			11.102	11.102		4910.3
500–599					6.769	0.999		7.768	7.768		4145.8
600–699					23.090			23.090	23.090		15257.8
700–799					51.497	0.788		52.285	52.285		39808.9
800–899					49.406		0.031	49.437	49.437		42716.3
900–999					33.868		0.046	33.914	33.914		31984.5
1000–1249					369.030		0.208	369.238	369.238		410474.2
1250–1499					62.654	0.226	0.091	62.971	62.971		81898.5
1500–1999					56.629	13.650	0.146	70.425	70.425		124202.2
2000–2999					48.168	11.440	0.745	60.353	59.904	0.449	236258.7
3000–3999					5.141	3.644		8.785	8.785		29538.9
4000–4999					4.857	0.182	0.331	5.370	5.370		24325.2
5000–5999					10.575	8.006	0.024	18.605	7.454	11.151	94454.7
6000–6999					0.239	0.271		0.510	0.510		3275.4
7000–7999					0.976	0.005		0.981	0.981		7287.9
8000–8999					0.310			0.310	0.310		2661.4
9000–9999 (None)											
10000–12499					0.040	0.809		0.849	0.849		8835.0
Over 12499 (None)											
Total	11.100		21.970		2094.377	43.048	1.649	2172.144	2160.544	11.600	
Daily vehicle miles	266.4		1147.6		1305044.0	120598.0	4919.3	1431425.3	1373920.4	58054.9	1431425.3
Average daily traffic	24		52		623	2801	2983	659	636	5005	

NOTE—No graded and drained (C), soil surfaced (D), or bituminous surfaces treated (F) on the Federal Aid System

TABLE NO. 22

MILEAGE OF RURAL ROADS IN EACH SURFACE WIDTH GROUP BY AVERAGE DAILY TRAFFIC VOLUME GROUPS
NEVADA FEDERAL AID SYSTEM, DECEMBER 31, 1947

Average traffic per 24-hour day	Surface Width in Feet							
	Under 18	18 19	20 21	22	23–26	27–29	30–32	33–35
0–9			0.222					
10–24	11.100							
25–49			12.370					
50–99		0.345	74.281	22.925	9.399			
100–199		89.792	555.825	6.004	0.174			
200–299		165.342	245.916	22.503	10.331			
300–399		22.630	123.076	10.688	0.446		12.172	
400–499		1.721	2.913		1.197		5.271	
500–599		6.394	0.077	0.999	0.298			
600–699			0.067		22.759			
700–799		10.196	29.990	8.541	3.503	0.026	0.021	
800–899		2.201	32.625	7.873	6.479			
900–999		2.194	9.664	4.889	16.688	0.045		
1000–1249		27.318	54.039	78.092	207.718	0.047	1.202	0.195
1250–1499		0.551	12.469	30.861	18.299	0.029	0.062	
1500–1999		0.519	34.686	15.799	15.202	0.164	1.097	0.655
2000–2999		2.661	24.247	16.247	16.153		0.109	
3000–3999			0.970	7.393				
4000–4999			1.509	2.203			0.256	
5000–5999			6.997	0.260				0.011
6000–6999				0.510				
7000–7999								
8000–8999				0.255	0.055			
9000–9999 (none)								
10000–12499				0.040				
Over 12490 (none)								
Total	11.100	331.864	1221.943	236.082	328.701	0.311	20.190	0.861
Daily vehicle miles	266.4	113150.6	530813.8	269900.5	414068.8	440.1	11641.2	1295.8
Average daily traffic	24	341	434	1143	1260	1415	577	1505

	36–39	40–43	44	45–49	50–54	55–59	60–and over	Total
0–9								0.222
10–24								11.100
25–49								12.370
50–99								106.950
100–199	0.077					0.002		651.874
200–299								444.092
300–399	0.074	0.417			0.002	0.038		169.543
400–499								11.102
500–599								7.768
600–699		0.227			0.037			23.090
700–799	0.008							52.285
800–899					0.259			49.437
900–999	0.241	0.112	0.081					33.914
1000–1249	0.024	0.015		0.139	0.264	0.006	0.179	369.238
1250–1499	0.551					0.013	0.136	62.971
1500–1999	0.091			0.744	0.222	0.266	0.980	70.425
2000–2999	0.033	0.403		0.449		0.051		60.353
3000–3999						0.422		8.785
4000–4999				0.724	0.229	0.449		5.370
5000–5999				3.928	0.186		7.223	18.605
6000–6999								0.510
7000–7999			0.428	0.553				0.981
8000–8999								0.310
9000–9999 (none)								
10000–12499						0.809		0.849
Over 12490 (none)								
Total	1.099	1.174	0.509	6.537	1.199	2.056	8.518	2172.144
Daily vehicle miles	1253.1	1411.1	3260.3	30045.2	3037.9	12589.8	38800.7	1431975.3
Average daily traffic	1140	1202	6405	4596	2534	6123	4555	659

TABLE NO. 23
COMPARISON OF AVERAGE DAILY TRAFFIC AT AUTOMATIC RECORDERS FOR SIX FISCAL YEAR PERIODS

Station	Location	Daily Average					
		1942–1943	1943–1944	1944–1945	1945–1946	1946–1947	1947–1948
101	U. S. 40, east of Sparks	1,223	967	1,084	1,847	2,120	2,281
102-A	U. S. 91 and 466, south of Las Vegas	1,226	915	924	1,703	2,249	2,347
103	State Route 46, south of Elko	148	116	131	175	237	290
104	U. S. 395, north of Carson City	861	668	759	1,373	1,775	1,820
106	State Route 59, south of Lovelock	206	202	248	339	415	316
107	U. S. 40, east of Elko	649	554	562	1,015	1,207	1,424
108	U. S. 50 and 93, north of McGill	319	224	212	323	392	488
109	U. S. 6 and 93, south of East Ely	296	270	206	308	388	440
110	U. S. 93, 95, and 466, southeast of Las Vegas	7,528	3,821	2,550	3,995	4,953	4,905
112	U. S. 6 and 95, west of Tonopah	411	384	413	402	416	461
114	U. S. 95, northwest of Las Vegas	321	342	312	343	371	395
115-A	U. S. 40, east of Wells	814	———	265	565	761	819
116	U. S. 40, west of Verdi	1,073	811	892	1,666	1,916	2,104
117	State Route 12, north of Logandale	———	———	245	335	373	372
118	U. S. 50, south of Carson City	———	———	219	625	858	961
119	State Route 3, south of Yerington	———	———	326	404	474	455
Totals		15,075	9,271	9,348	15,418	18,905	19,878
Percentage increase or decrease from previous year		+6.6*	—35.0†	—10.6‡	+64.9	+22.6	+5.1

*Excludes Recorder 102-A. †Excludes Recorder 115-A. ‡Excludes Recorders 115-A, 117, 118, and 119.

TABLE NO. 24
DRIVER LICENSES ISSUED
July 1, 1946, to June 30, 1948

Fiscal year	Original	Operators renewal	Combined duplicates	Original	Chauffeurs renewal	Total
1947	9,746	37,316	862	2,065	5,230	55,219
1948	11,453	13,926	1,045	2,028	5,358	33,810
Total	21,199	51,242	1,907	4,093	10,588	89,029

REVOCATIONS OF DRIVING PRIVILEGE
July 1, 1946, to June 30, 1948

Drunken driving	354
Unlawful taking of motor vehicle	5
Habitual negligence	5
Driving while license revoked	2
Hit and run	2
Mentally incompetent	1
Manslaughter	2
Total	371

SUSPENSIONS OF DRIVING PRIVILEGE
July 1, 1946, to June 30, 1948

Drunken driving (out of State)	55
Reckless driving and speeding	274
False information	1
Habitually negligent	7
Driving while under suspension	1
Miscellaneous	5
Total	343
Driving without consent of owner (cancelled)	3
False statement (cancelled)	8
Total	11

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